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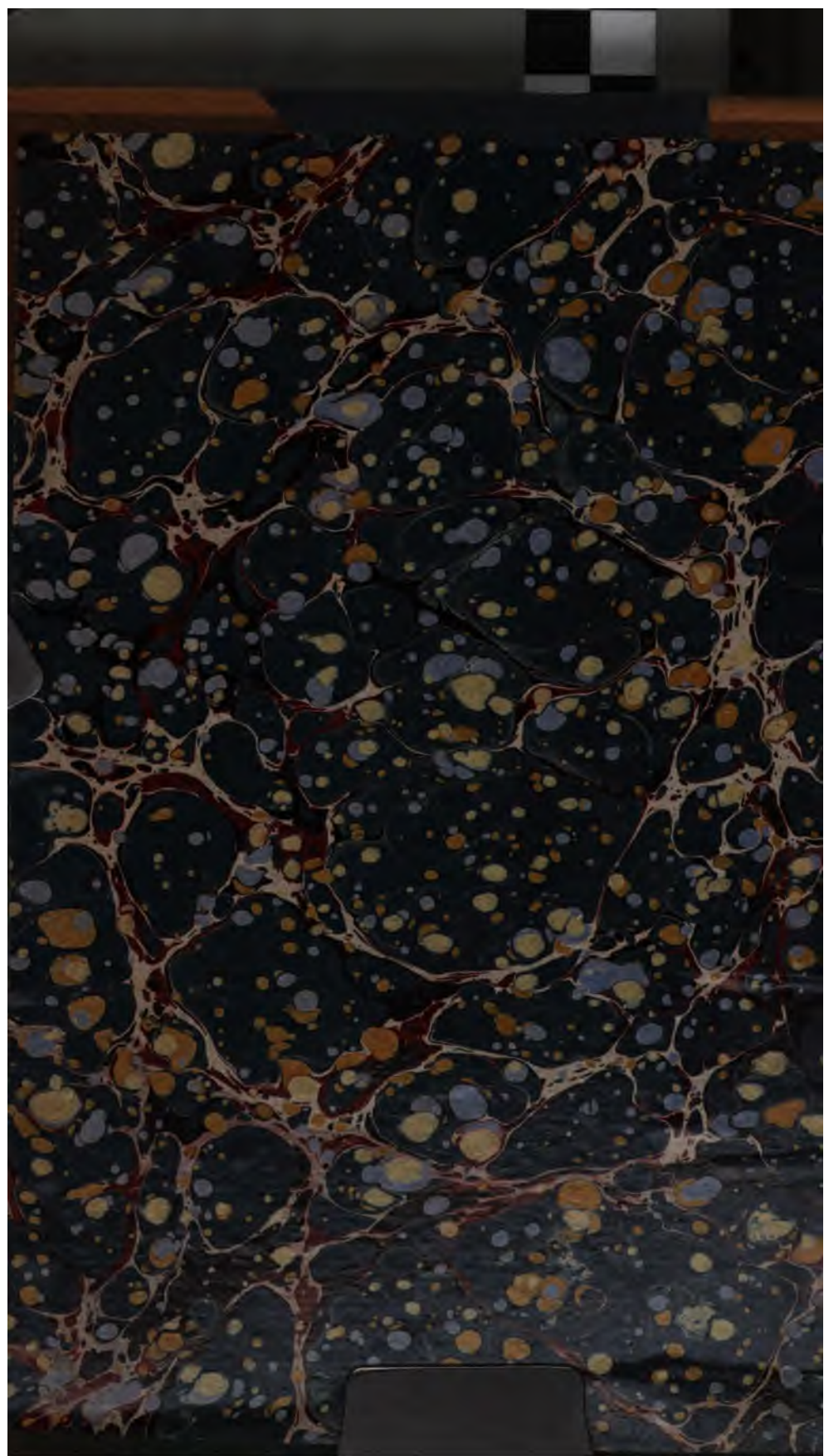
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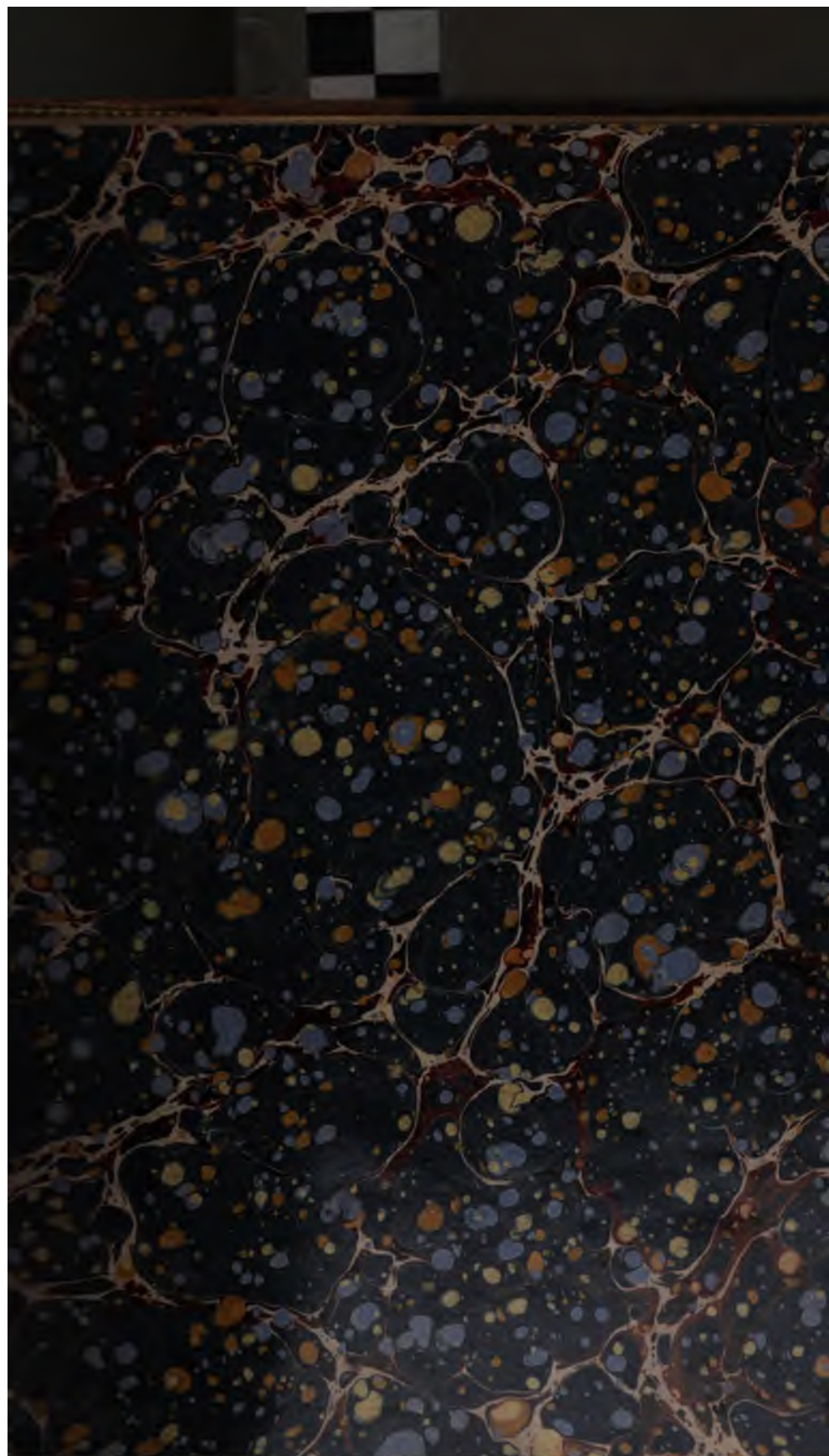
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2. 1943-1944

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WILLIAM H. EDWARDS.

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No. 1.

WILLIAM H. EDWARDS.

Our readers will all, we are sure, be glad to receive with the first number of a new volume of the CANADIAN ENTOMOLOGIST the accompanying excellent portrait of the well-known and now venerable Entomologist, Mr. W. H. EDWARDS, of Coalburgh, West Virginia. His life-long work has been the study of Diurnal Lepidoptera, and the results of that work are splendidly set forth in the beautifully illustrated volumes of his "Butterflies of North America." In April, 1868, the first part was issued, and at once commended itself to entomologists everywhere by the exquisite beauty and finish of the plates and their faithfulness to nature. In July, 1872, the first Series, forming a large quarto volume with fifty plates, was completed. The second Series, containing fifty-one plates, was begun in May, 1874, but not finished until November, 1884, the less frequent issue of the parts being more than compensated for by the increased value of both plates and letterpress. When the work was begun, as Mr. Edwards stated in his preface, little or nothing was known of the eggs, larvæ or chrysalids of any except the commonest butterflies, and accordingly his first volume illustrated only the perfect state. In 1870 he made the notable discovery that eggs could be satisfactorily obtained by confining the female butterfly of any species with the growing food-plant of its larva, and at once began the study of the life-histories of a number of species previously known only in the imago state. The results of these studies are admirably set forth in the letterpress as well as in the plates of the second and third Series; on these are accurately depicted eggs and larvæ in their different stages, as well as chrysalids and imagoes. Many wonderful discoveries have been made during these investigations, among the first being that of the seasonal trimorphism of *Papilio Ajax*, and the dimorphism of *Grapta Interrogationis*, and of *G. Comma*. The process of breeding was soon taken up by Mr. Edwards's friends and correspondents all over North America, and, aided by the general extension of railways over the Continent, he was able to get eggs of butterflies from widely distant localities,

and to follow them successfully through all their stages. Thanks to his efforts, the reproach of ignorance of the preparatory states of our butterflies has been removed, and though much remains to be learnt, vast progress has already been made. The first part of the third Series was issued in December, 1886, and in October last we had the pleasure of welcoming the sixteenth. Far from showing any decline from the Author's high standard of excellence, this last issue may justly be regarded as the climax of good work, both on the part of the writer and the artist. All through Mr. Edwards has been fortunate in having his wishes so ably carried out by his artist-assistants, Mrs. Mary Peart, of Philadelphia, who has drawn most accurately nearly all the plates, and, in order to do so satisfactorily, has reared most of the caterpillars, and Mrs. Lydia Bowen, who has so exquisitely performed the work of colouring.

In addition to the great work that we have just referred to, Mr. Edwards has contributed largely to the periodical literature of science, especially to the Proceedings and Transactions of the American Entomological Society and the CANADIAN ENTOMOLOGIST. His first contribution to our pages was published in the third number of our first volume, in 1868, and he has continued to favour us with articles of great value ever since; his last paper, in the September number of Volume XXVII., being the one hundred and sixty-eighth which he has written for our journal.

Mr. Edwards was born on the 15th of March, 1822, and will soon complete his seventy-fourth year. That he may long be spared in health and prosperity to carry on his excellent work is the cordial wish of the writer and all his friends.

C. J. S. B.

THE "BOMBYCES": WHAT ARE THEY?

BY HARRISON G. DYAR, PH. D., NEW YORK.

It might be better to say "what were they?" in an article addressed to readers of to-day, since the name in its old sense will not be found in the most recent writings of Packard, Comstock, Chapman, Grote, and other authors. However, the group is adopted in our latest check-list (Nos. 877-1459), although without its name, Prof. Smith stating that he could not limit the group to his satisfaction. Also, as recently as 1893, Dr. Packard published an "Attempt at a new classification of the Bombyces," including in the group all the families formerly included, but altering their sequence. Following the arrangement of suborders pro-

posed by Prof. Comstock, and the division into superfamilies which I have suggested and which Mr. Grote has adopted with improved nomenclature*, let us see where the families of "Bombyces" fall.

From the JUGATÆ, we find the Hepialidæ only, the most highly specialized Jugates in respect to the abortion of the mouth parts. From the FRENATÆ as follows:—

Superfamily Tineides.—The Eucleidæ, Megalopygidæ, Anthroceridæ and Pyromorphidæ from the apex of development along the main stem; the Psychidæ, Lacosomidæ and Heterogynidæ, side branches, but all specialized (the much specialized Sesiidæ went with the Sphingidæ), and finally the Cossidæ, a low type, but of large size.

Superfamily Agrotides.—All the families, except those called Zygaenidæ, the Agrotidæ and Geometridæ, the two latter (with the exception of the Notodontidæ) the lowest types in the superfamily.

Superfamily Bombycides.—The whole group.

Superfamily Sphingides.—None, this group being recognized as distinct, although the Sesiidæ and Thyridæ were associated with it.

Superfamily Papilionides.—None.

Thus it will be seen that the Bombyces consisted of the higher types in all lines of development, regardless of relationship. If we imagine the genealogical tree of Lepidoptera as growing upright from the ground, the several branches and twigs representing the families and being of length proportional to their degree of specialization, the old classification would be represented by *horizontal* planes. The uppermost would cut off the very summit of the tree, the Papilionides; the next would take the next succeeding top branches, perhaps the Sphingides, and the tip of a side branch from the Tineid trunk, say the Sesiidæ. The next cut might give the old Zygaenidæ, consisting of some families from the Agrotid and Tineid trunks, and the fourth cut is our Bombyces, taking branches of all the trunks that are approximately equal in degree of specialization. The base of the tree would comprise the rest of our old familiar families, the Noctuidæ, Micros, etc.

It is the aim of more recent work to follow the lines of genealogy, a classification cutting our imaginary tree in *vertical* planes, including in each group all families related to each other in the same line of descent, regardless of degree of specialization.

*Syst. Lep. Hildesheim, 1895.

CONCERNING FELTIA, AND OTHER MATTERS.

BY JOHN B. SMITH, SC. D.

The question asked by Mr. Slingerland in his very interesting paper in the CAN. ENT., XXVII, p. 301, is in great part answered by himself. I think he shows very conclusively that *subgothica*, Haw., is correctly used for our American species, and has given us a very full statement of the evidence upon which he bases his conclusions, thus removing the matter from the domain of unsupported opinion. From the nature of the case, and in the absence of Haworth's actual type specimen, the proof cannot be absolute; but until something more definite is supplied, I think the conclusions of the paper on the identity of *subgothica*, must be accepted. As to the synonymy, I think Mr. Slingerland is also correct. I have not found the A. O. U. Code clear on this matter, though it is as to genera in the same case; but, after consulting Dr. C. Hart Merriam, a recognized authority on questions of nomenclature, I am assured that Guenée's name *jaculifera* must sink as a synonym. On this, the main features of the paper, I accept all of Mr. Slingerland's conclusions; but I was a little surprised to find him defending genitalic characters as possibly good for generic divisions, in the apparent belief that I had used these characters as a basis for my division of the mass of species I found lumped as *Agrotis*! I believe that, with the possible exception of Mr. Scudder, no one in America has studied the genitalia of more insects of all orders than I. Certainly no one has figured more, and no one has insisted more strongly upon the value of these characters for specific distinction. I have examined in some cases over one hundred specimens of a single species without discovering appreciable variation, and while I was engaged in the study of *Lachnosterna* I examined nearly 2,000 specimens of the *fusca* group alone, for these characters. Yet, while insisting on their specific value, I have also pointed out that while easily distinguished species often have very similar genitalic structures, very closely allied species—superficially—may have them utterly unlike. Nowhere have I ever claimed that genitalic characters afford good bases for genera; on the contrary, I am distinctly of the opinion that they should not be used except in very special cases. The only instance where I have yet found it desirable to make use of them as a sole character, is in the series of species which I have called *Porosagrotis*. That is an expediency genus, and stated as such, with the reasons for it.

Yet, somehow, the idea seems to be current that all my work, in *Agrotis* at least, is based on genitalic characters only! Mr. Dyar, in a book notice, CAN. ENT., XXVII., 225, says: "Under *Agrotis* the genitalic divisions* of Prof. Smith are given subgeneric value only, a proceeding which commends itself to the present reviewer." So Mr. Slingerland, on pp. 306 and 307 of the paper already cited, accepts this as a correct statement, and voices a doubt as to the value of such a basis. I was interested enough to write Mr. Slingerland on the subject, and he frankly acknowledged in return: "Yes; I simply followed Grote and Dyar in my statements regarding your divisions of the genus *Agrotis*." And Mr. Dyar, I have no doubt, simply followed Mr. Grote! Now, I would not be understood as questioning for a moment the divine right of a critic to condemn without reading or understanding the work criticised, or to impute views to suit himself; but I must confess that I am inclined to have more regard for comments when the criticism indicates an understanding of the author's actual position. But perhaps this is merely a prejudice on my part!

Yet it is something of a surprise that Mr. Grote's statements concerning my work or views should find unquestioned acceptance anywhere. When any of my papers are under his consideration, condemnation is nearly always certain, and Mr. Grote is always a much-abused individual. If the facts do not bear out the desired conclusion, why so much the worse for the facts. For instance, we find in the CAN. ENT. for 1894, Vol. XXVI., pp. 82 and 83, the following plaint:—"Prof. Smith goes still further. He suppresses my reference of the species described by Moeschler as *islandica* to *opipara*, in 1892, as cited above, and has the courage to write, 'the error is Mr. Grote's for condemning Mr. Morrison's species on insufficient grounds!' By also suppressing Moeschler's original determination, I am brought in for a synonym I never committed!" If reference is made to my Revision of *Agrotis*, Bulletin No. 38, U. S. Nat. Mus., p. 183, the following will be found: "Mr. Grote was correct in referring *opipara* and *islandica*, Moeschl. (nec Stgr.), as synonymous. The error is Moeschler's in failing to recognize the distinction between the forms, and Mr. Grote's for so positively condemning Mr. Morrison's species on insufficient grounds." How much now remains of Mr. Grote's complaint? If the curious reader will take the trouble to look into the

*The italics are mine. Note the plural. Mr. Grote uses *all* my divisions as subgenera.

literature of the subject, I think he will find Mr. Grote's criticisms on Mr. Morrison's writings and on the species described by him, at least severe enough to justify my statement.

So I am charged with ignoring Mr. Grote's work, and of failing to give him due credit. He writes (Abh. des. n-w Ver. zu Bremen, XIV., p. 16 of separate), after quoting my statement of the bases for subdividing *Agrotis*: "This is only a restatement of my original recommendation. As a matter of fact, throughout Smith merely applies rigorously the structural characters pointed out by me long before, and which I lacked time and material to ascertain in the case of each species. In this same paper I say: 'Subdivisions of the genus can be undertaken when the form of the genitalia is studied. This character, taken in connection with the antennal structure, will give us subgenera and assist in the identification of our numerous species.' This is precisely what Smith gives us after a lapse of seven years, and without making proper mention of my initiatory work. He follows my lead as if I had not pointed out the way."* Mr. Grote is quite right in the statement that I gave him no credit for the characters used by me, and this is simply because they were not in any sense of the word original with him. Lederer used them in his work on the European Noctuids, so long ago as 1857, and so many other writers, antedating Mr. Grote, used them, that they long since became common or universal knowledge. I made no claim to originality in their use, and concede none to Mr. Grote. I made a bald statement of the characters employed; nothing more. I do claim originality, however, for the use of the claspers instead of the side-pieces (harpes) alone. Lederer used the latter only, and Mr. Grote nowhere went further than Lederer.

Mr. Slingerland questions also whether we shall use *Feltia* or *Agronoma*, because Mr. Grote asserts that the two are synonyms and the latter, with *vestigialis* as type, antedates *Feltia*. Mr. Slingerland failed to find material in Mr. Grote's writings to determine the matter and, quite correctly, does not accept his bald statement as decisive. I gave in my Revision (p. 109), under *Feltia*, the following: "The distinctive characters of the species grouped under the present term are, spinose and quite heavily armed fore tibiae; protuberant, rough front, pectinated or serrate antennae, usually wide wings with dark colours and a tendency to

*The italics are mine.

a radiate type of maculation." Mr. Grote, writing from Europe, of a common European species, presumably had specimens at hand for examination, and to the scientific student it would seem as if a clinching argument could be presented in the simple statement that *vestigialis* presented just these structural characters. But except for a reference to the maculation, such a statement is carefully avoided! It may be added, indeed, that in nearly every case where Mr. Grote has replaced a generic name proposed by me by an "earlier" term, he gives no structural characters to sustain his point. It is loose assertion merely. I found in the Martindale collection at the Ac. Nat. Sci. of Philadelphia, a good pair of *vestigialis*; through the courtesy of Mr. E. L. Graef, of Brooklyn, N. Y., I obtained another pair; and from the U. S. National Museum I obtained two additional males, by the kindness of the officials in charge. I compared these carefully with the descriptions of the species accessible to me, that no reasonable doubt might exist as to their identity and then found, as I had expected from Mr. Grote's silence, that there is no protuberant, rough front, and there are no heavily armed fore tibiae! The species belongs to *Agrotis* as restricted by me. If, as Mr. Grote states, *vestigialis* is the type of *Agronoma*, this name can never replace *Feltia*, with *ducens* (*subgothica*) as type, whether we use it in a generic or sub-generic sense. I have absolutely no prejudice in favour of any of the generic names adopted or proposed by me, and am ready to suppress any or all of them in favour of others previously used. I ask only that there shall be a scientific demonstration of their identity; not merely a loose statement without facts given to support it. Lepidopterists have been too long looked upon as triflers rather than as students, because of this very lack of scientific accuracy in their work; but I am happy to say that to the more recent writers, including the Messrs. Slingerland and Dyar, this reproach cannot be made. With the beginning of a Scientific study, structural characters are discovered in all stages that upset our previous notions, and the classification of the order is therefore in an unsettled condition. I believe that it will remain so for some time to come; but every accurate contribution adds clearness, and while their novelty may induce the placing of too much stress upon newly discovered facts, they will, eventually, be fitted into their proper places.

Now, concerning the term *Noctuidæ* which Mr. Grote proposes to replace by *Agrotidæ*! He says: "The family name *Agrotidæ* is proposed instead of the usual term *Noctuidæ* since the generic title *Noctua*

is preoccupied" (Abh. Naturw. Ver. Brem., XIV., p. 1 of separate), and again (l. c., p. 21): "The term *Noctua*, used by authors for this section, is, as I understand the matter, preoccupied in the Birds and, according to the rules, cannot be used a second time in Zoology." Again no facts are given, and again Mr. Dyar repeats, CAN. ENT., XXVII., 225, "The name *Agrotidæ* is proposed for the customary *Noctuidæ*, as the term *Noctua* is preoccupied in Birds." Mr. Dyar thus seems to accept the change and repeats, as a fact, Mr. Grote's positive statement that the name is preoccupied. It may be so; these gentlemen may have information not accessible to me, and in order to bring it out I state my own knowledge as follows:—

In Scudder's "Nomenclator" we find

Noctua, Klein, Moll., 1753,

Noctua, Fabr., Lep., 1776,

Noctua, Sav., Aves., 1809,

Noctuæ, Linn., Lep., 1758.

In the Century Dictionary, that marvellous storehouse of terms, the same order is observed: (*a*) an old genus of Mollusca, Klein, 1751; the date here differing from Scudder; (*b*) a genus in Lepidoptera, and (*c*) a genus of Owls by Savigny in 1809.

I cannot find in any dictionary of Ornithology any earlier use of the term *Noctua*, though this of course does not prove that there is none.

Noctua, Klein, 1751 or 1753, is certainly the earliest use of the term; but here we run up against the following:

"Canon XII.—The Law of Priority begins to be operative at the beginning of Zoological nomenclature."

"Canon XIII.—Zoological nomenclature begins at 1758, the date of the Xth edition of the 'Systema Naturæ' of Linnæus."

We find that the term *Noctuæ* was used for the Lepidoptera in the very publication with which Zoological nomenclature begins, although *Noctua* as a generic term in the order is to be credited to Fabricius.

It is possible, of course, that some publications exist, which were overlooked by the authorities cited by me; but if this is so, Mr. Grote certainly owes it to Zoological Science at large to refer to them, and to give the reasons for rejecting *Noctua* as a term "preoccupied in the Birds."

LIST OF HYMENOPTERA TAKEN AT SUDBURY, ONT.

BY JOHN D. EVANS, TRENTON, ONT.

In the following list 283 species are enumerated, 34 not determined specifically, and there are 8 species unknown, making a total of 325 species. I am much indebted to Mr. W. H. Harrington for his very great kindness and valued assistance in identifying these insects.

Collecting was also done in some of the other orders, viz.: Diptera, Orthoptera, and Neuroptera; more especially in the first mentioned, in which many fine specimens were taken, and await determination:—

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| <i>Cimbex americana</i> , Leach. | <i>Strongylogaster longulus</i> , Nort. |
| =var. 10-maculata, Leach. | " <i>pinguis</i> , Nort. |
| <i>Trichiosoma triangulum</i> , Kirby. | " <i>soriculatus</i> , Prov. |
| <i>Hylotoma clavicornis</i> , Fab. | " <i>terminalis</i> , Say. |
| " <i>McLeayi</i> , Leach. | <i>Pæcilostoma albosecta</i> , Prov. |
| " <i>scapularis</i> , Klug. | <i>Tenthredo mutans</i> , Nort. |
| <i>Priophorus æqualis</i> , Nort. | " <i>rufipes</i> , Say. |
| <i>Nematus aureopectus</i> , Nort. | " <i>semirubra</i> , Nort. |
| " <i>inquilinus</i> , Walsh. | " <i>signata</i> , Nort. |
| " <i>lateralis</i> , Nort. | " <i>verticalis</i> , Say. |
| " <i>luteotergum</i> , Nort. | <i>Tenthredopsis delta</i> , Prov. |
| " <i>malacus</i> , Nort. | " <i>Evansii</i> , Hargtn. |
| " <i>placensus</i> , Nort. | <i>Lophyrus abietis</i> , Harr. |
| " <i>rufocinctus</i> , Hargtn. | " <i>Lecontei</i> , Fitch. |
| " <i>ventricosus</i> , Klug. | <i>Lyda fascipennis</i> , Cress. |
| " <i>violaceipennis</i> , Nort. | " <i>pallimacula</i> , Nort. |
| <i>Harpiphorus maculatus</i> , Nort. | <i>Oryssus Sayi</i> , var. <i>affinis</i> , Harr. |
| <i>Dolerus aprilus</i> , Nort. | <i>Xiphydria Provencheri</i> , Cress. |
| " <i>arvensis</i> , Say. | <i>Urocerus albicornis</i> , Fab. |
| " <i>bicolor</i> , Beauv. | " <i>caudatus</i> , Cress. |
| " <i>sericeus</i> , Say. | " <i>cyaneus</i> , Fabr. |
| <i>Monophadnus rubi</i> , Harr. | " <i>flavicornis</i> , Fabr. |
| <i>Macrophya albomaculata</i> , Nort. | " <i>nigricornis</i> , Fabr. |
| " <i>epinota</i> , Say. | <i>Figites impatiens</i> , Say. |
| " <i>flavicoxæ</i> , Nort. | <i>Aulacus rufitarsis</i> , Cress. |
| " <i>trisyllaba</i> , Nort. | <i>Fænus incertus</i> , Cress. |
| <i>Pachyprotasis omega</i> , Nort. | " <i>tarsatorius</i> , Say. |
| <i>Taxonus</i> , Sp. | <i>Ichneumon brevipennis</i> , Cress. |

| | |
|-------------------------------------|---------------------------------------|
| Ichneumon canadensis, <i>Cress.</i> | Phygadeuon rotundiceps, <i>Prov.</i> |
| " cincticornis, <i>Cress.</i> | " rubrocinctus, <i>Prov.</i> |
| " cœruleus, <i>Cress.</i> | " sp. |
| " comes, <i>Cress.</i> | " sp. |
| " comptus, <i>Say.</i> | Cryptus extrematis, <i>Cress.</i> |
| " duplicatus, <i>Say.</i> | " robustus, <i>Cress.</i> |
| " grandis, <i>Brullé.</i> | " rufoannulatus, <i>Prov.</i> |
| " Grotei, <i>Cress.</i> | " n. sp. |
| " inconstans, <i>Cress.</i> | Linoceras Cloutieri, <i>Prov.</i> |
| " instabilis, <i>Cress.</i> | Hemiteles mandibularis, <i>Prov.</i> |
| " munificus, <i>Cress.</i> | Ophion bilineatum, <i>Say.</i> |
| " navus, <i>Say.</i> | " macrurum, <i>Linn.</i> |
| " nuncius, <i>Cress.</i> | " purgatum, <i>Say.</i> |
| " parvus, <i>Cress.</i> | Exochilum nigrum, <i>Prov.</i> |
| " rubicundus, <i>Cress.</i> | " occidentale, <i>Cress.</i> |
| " rufiventris, <i>Brullé.</i> | Anomalon anale, <i>Say.</i> |
| " similaris, <i>Prov.</i> | " semirufum, <i>Nort.</i> |
| " subcyaneus, <i>Cress.</i> | Opheltes glaucopterus, <i>Linn.</i> |
| " trizonatus, <i>Prov.</i> | Paniscus albovariegatus, <i>Prov.</i> |
| " vecors, <i>Cress.</i> | " geminatus, <i>Say.</i> |
| " versabilis, <i>Cress.</i> | Campoplex diversus, <i>Nort.</i> |
| " sp. | " laticinctus, <i>Cress.</i> |
| " n. sp. | " vicinus, <i>Prov.</i> |
| Amblyteles expunctus, <i>Cress.</i> | " alius, <i>Nort.</i> |
| " nubivagus, <i>Cress.</i> | " sp. |
| " ormenus, <i>Cress.</i> | Limneria Guignardi, <i>Prov.</i> |
| " stadaconensis, <i>Prov.</i> | " parva, <i>Prov.</i> |
| " subrufus, <i>Cress.</i> | " rufipes, <i>Prov.</i> |
| " suturalis, <i>Say.</i> | " sp. |
| Phæogenes orbis, <i>Prov.</i> | " sp. |
| " tuberculifer, <i>Prov.</i> | " sp. |
| Ischnocerus? sp. | " n. sp. |
| Nematopodius, sp. | Pyracmon macrocephalum, <i>Prov.</i> |
| Phygadeuon acaudus, <i>Prov.</i> | Mesochorus, sp. |
| " indistinctus, <i>Prov.</i> | Exetastes rufosemoratus, <i>Prov.</i> |
| " fusiformis, <i>Prov.</i> | " sp. |
| " jocosus, <i>Prov.</i> | Banchus borealis, <i>Cress.</i> |
| " nitidulus, <i>Prov.</i> | " canadensis, <i>Cress.</i> |

- Banchus flavescens*, *Cress.*
 " *flavovariegatus*, *Prov.*
Mesoleptus canaliculatus, *Prov.*
 " *sp.*
 " *sp.*
Megastylus, n. sp.
Mesoleius submarginatus, *Cress.*
 " *sp.*
Tryphon americanus, *Cress.*
 " *pediculatus*, *Prov.*
 " *seminiger*, *Cress.*
Euceros Couperii, *Cr.*
Polyblastus annulipes, *Cress.*
Cteniscus clypeatus, *Cress.*
Exyston clavatus, *Cress.*
Exochoides borealis, *Cress.*
Exochus atrocoxalis, *Cress.*
 " *laevis*, *Cress.*
Bassus orbitalis, *Cress.*
 " *pulchripes*, *Prov.*
Coleocentrus Pettitii, *Cress.*
Arotes formosus, *Cress.* var.
Rhyssa persuasoria, *Linn.*
Thalessa atrata, *Fab.*
Ephialtes gigas, *Walsh.*
 " *pygmæus*, *Walsh.*
 " *tuberculatus*, *Four.*
Pimpla conquisitor, *Say.*
 " *4-cingulata*, *Prov.*
 " *inquisitor*, *Say.*
 " *novita*, *Cress.*
 " *Ontario*, *Cress.*
 " *pedalis*, *Cress.*
 " *tenuicornis*, *Cress.*
 " *sp.*
Polysphincta texana, *Cress.*
 " *sp.*
Cylloceria occidentalis, *Cress.*
- Lampronota americana*, *Cress.*
 " *parva*, *Cress.*
 " *punctulata*, *Cress.*
 " *varia*, *Cress.*
 " *sp.*
Meniscus scutellaris, *Cress.*
Phytodietus vulgaris, *Cress.*
Euxorides americanus, *Cress.*
Xylonomus stigmapterus, *Say.*
 " *canadensis*, *Hargtn.*
Odontomerus mellipes, *Say.*
 " *canadensis*, *Prov.*
 " *n. sp.*
Echthrus abdominalis, *Cress.*
 " *niger*, *Cress.*
 " *rufopedibus*, *Hargtn.*
Bracon dissitus, *Cress.*
 " *obliquus*, *Prov.*
 " *n. sp.*
Rhogas abdominalis, *Cress.*
 " *terminalis*, *Cress.*
Apanteles cinctus, *Prov.*
Agathis liberator, *Brullé.*
Microdus annulipes, *Cress.*
Meteorus vulgaris, *Cress.*
Gymnoscelus pedalis, *Cress.*
Macrocentrus mellipes, *Prov.*
Leucospis affinis, *Say.*
Eurytoma auriceps, *Walsh.*
Isosoma, sp.
Monodontomerus montivagus,
 Ashm.
Perisemus prolongatus, *Prov.*
Proctotrypes rufigaster, *Prov.*
 " *longiceps*, *Ashm.*
Pteromalina, sp.
Platygaster aphidis, *Ashm.*
Cleptes insperata, *Aaron.*

-
- Omalus læviventris*, *Cress.*
Hedychrum violaceum, *Brullé.*
Chrysis hilaris, *Dahlb.*
Camponotus herculeanus, *Linn.*,
 var. *pictus*, *Foul.*
Camponotus marginatus, *Latr.*
Formica sanguinea, *Latr.*
Myrmica, sp.
Sapyga maculata, *Prov.*
 " *Martini*, *Smith.*
Pompilus albosignatus, *Prov.*
 " *cylindricus*, *Cress.*
 " *hyacinthinus*, *Cress.*
 " *marginatus*, *Say.*
 " *maurus*, *Cress.*
 " *philadelphicus*, *Cress.*
 " *virginiensis*, *Cress.*
 " sp.
Agenia pulchripennis, *Cress.*
Prionemism alienatus, *Smith.*
Ceropales fraterna, *Smith.*
Ammophila communis, *Cress.*
 " *luctuosa*, *Smith.*
 " *vulgaris*, *Cress.*
Sphex apicalis, *Harr.*
Astata unicolor, *Say.*
Hoplilus atricornis, *Pack.*
 " *ephippiatus*, *Pack.*
 " *phaleratus*, *Say.*
Cerceris nigrescens, *Smith.*
Mimesa basirufa, *Pack.*
Cemonus inornatus, *Say.*
Pemphredon concolor, *Say.*
Passakecus mandibularis, *Cress.*
Trypoxylon frigidum, *Smith.*
Crabro ater, *Cress.*
 " *chrysarginus*, *St. Farg.*
 " *cubiceps*, *Pack.*
- Crabro interruptus*, *St. Farg.*
 " *maculipennis*, *Fabr.*
 " *oblongus*, *Pack.*
 " *producticollis*, *Pack.*
 " *sex-maculatus*, *Say.*
 " *villosifrons*, *Pack.*
 " sp.
Thyreopus advenus, *Smith.*
 " *coloradensis*, *Pack.*
 " *latipes*, *Smith.*
Eumenes fraternus, *Say.*
Odynerus albomarginatus, *Sauss.*
 " *albophaleratus*, *Sauss.*
 " *canadensis*, *Sauss.*
 " *capra*, *Sauss.*
 " *catskillensis*, *Sauss.*
 " *debilis*, *Sauss.*
 " *leucomelas*, *Sauss.*
 " *philadelphiae*, *Sauss.*
Polistes pallipes, *Lepell.*
Vespa maculata, *Fab.*
 " *scelesta*, *McFarland.*
 " *vulgaris*, *Linn.*
 " sp.
Colletes americana, *Cress.*
Prosopis affinis, *Smith.*
 " *basalis*, *Smith.*
Sphecodes dichroa, *Smith.*
 " *falcifer*, *Patton.*
Halictus albitarsis, *Cress.*
 " *constrictus*, *Prov.*
 " *coriaceus*, *Smith.*
 " *ligatus*, *Say.*
 " *pilosus*, *Smith.*
 " *scabrosus*, *Prov.*
 " sp.
 " sp.
 " sp.

| | |
|-------------------------------------|--|
| <i>Augochlora purus</i> , Say. | <i>Megachile consimilis</i> , Cress. ? |
| <i>Andrena frigida</i> , Smith. | " <i>grandis</i> , Cress. |
| " <i>hirticeps</i> , Smith. | " <i>melanophæa</i> , Smith. |
| " <i>nivalis</i> , Smith. | " <i>optiva</i> , Cress. |
| " <i>vicina</i> , Smith. | " <i>pugnata</i> , Say. |
| " sp. | " <i>simplex</i> , Prov. |
| <i>Calliopsis æstivalis</i> , Prov. | <i>Melissodes rustica</i> , Say. |
| <i>Nomada americana</i> , Kirby. | <i>Anthophora bomboidea</i> , Kirby. |
| <i>Epeolus mercatus</i> , Fab. | <i>Clisodon terminalis</i> , Cress. |
| <i>Coelioxys alternata</i> , Say ? | <i>Apathus Ashtoni</i> , Cress. |
| " <i>tristis</i> , Cress. ? | <i>Bombus borealis</i> , Kirby. |
| <i>Osmia buconis</i> , Say. | " <i>consimilis</i> , Cress. |
| " <i>bucephala</i> , Cress. | " <i>fervidus</i> , Fab. |
| " <i>frigida</i> , Smith. | " <i>lacustris</i> , Cress. ? |
| " <i>lignaria</i> , Say. | " <i>ternarius</i> , Say. |
| " <i>simillima</i> , Smith. | " <i>terricola</i> , Kirby. |
| <i>Monumetha borealis</i> , Cress. | " <i>virginicus</i> , Linn. |
| <i>Anthidium simile</i> , Cress. | |

THE MEDITERRANEAN FLOUR MOTH, EPHESTIA KUEHNIELLA, ZELLER, STILL IN CANADA.

The determined and energetic fight carried on by the miller, the entomologist, and the Local Government in 1889, to stamp out this destructive mill pest in Ontario, is too fresh in the memory of those who witnessed that outbreak to warrant a repetition of the particulars. Suffice it to say that the flour moth is still very abundant in certain Canadian mills. I have received it recently in flour sent me direct from a milling firm in Valleyfield, Quebec, with an urgent appeal for help. The mill has been obliged to shut down several times during the present year to clean out the enormous accumulations of matted flour and webs in the spouts and elevator legs. The mill is a new one and has been running a very short time. It is said the pest came from a neighboring firm. My experience with this moth in California and other places convinces me that it is the worst pest millers have to combat, and this note should be a signal warning to all those interested in the milling business. I have also recently discovered the same pest in Southwestern New York State, where it has done considerable mischief this year, and is still spreading. It has occasioned much loss on the Pacific Coast also the present season. If something is not done to arrest and destroy this advancing enemy in the United States and Canada, I predict very serious results to the milling industries of both countries.

W. G. JOHNSON.

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ASPIDIOTUS PERNICIOSUS, COMSTOCK, AND AONIDIA FUSCA,
MASKELL: A QUESTION OF IDENTITY OR VARIATION.

BY W. M. MASKELL, WELLINGTON, NEW ZEALAND.

In the "Report of the Entomologist of the United States Department of Agriculture for the year 1880," Professor Comstock described (p. 304) an extremely injurious insect of the family Coccidæ, to which he gave the name *ASPIDIOTUS PERNICIOSUS*, or "the pernicious scale," and he stated that this insect attacked a very large number of deciduous fruit-trees in California, "excepting peach, apricot, and black tartarean cherry." Later, this pest was observed, described and discussed by many persons interested in horticulture, and in America it is generally known by the trivial name of "the San José scale," and is looked on as a most troublesome thing.

An article in "Insect Life," Vol. VI., No. 5, September, 1894, contains much information relative to this insect, and its occurrence in various places in America since 1880. Here and there the scale appears to have been found on peach, but only in small quantity; the principal victims are pear, plum, Japanese plum, apple, currant, etc., and most especially pear. In a subsequent article ("Insect Life," Vol. VII., No. 2, p. 165) the same trees are mentioned, with the addition of Japanese quince, and elm (American?). Again, in the same publication (Vol. VII., p. 285) the pear is given as the chief victim of this scale.

In the Agricultural Gazette, of New South Wales, September, 1892, p. 698, Mr. A. S. Olliff reports *ASP. PERNICIOSUS* in Australia on pear.

In September, 1894, I received from Mr. French, of Melbourne, some twigs of peach trees thickly covered with a scale which, in my paper on Coccidæ (read November, 1894; published in Transac. New Zealand Institute, Vol. XXVII.), I identified as belonging to the genus *AONIDIA*, and named *AON. FUSCA*.

In March, 1895, the same gentleman sent me some apple twigs with many scales, which I found to be *ASPIDIOTUS PERNICIOSUS*.

Finally, in July, 1895, Mr. Olliff sent me twigs of pear, peach, and apple, from New South Wales, much infested by *ASPIDIOTUS PERNICIOSUS*.

It was whilst examining these last specimens that the characters which I observed in the adult females led me to compare them closely with those of *AONIDIA FUSCA*, and, as a result, I cannot help being considerably perplexed.

The opinion which, for many years past, I have persistently advocated, as regards the study of Coccidæ, is that it is always better to base distinctions, where possible, upon anatomical characters of the insects themselves, rather than upon external features of the coverings, waxy or cottony, or otherwise, under which they are sheltered. These coverings may vary so much according to accidental circumstances that I think they should be considered as of secondary, or even less, importance. In the case of the two insects of which I am now treating, I am sorry to say that I did not adhere strictly enough to my own rule. Size, colour, form of the scale, food-plant, and such like things, have been so greatly insisted upon, as I find, in all the accounts of *ASPIDIOTUS PERNICIOSUS*, that I have perhaps attached too much importance to them, and, consequently, it is possible that my identification of *AONIDIA FUSCA* is erroneous.

All the authors who describe *ASP. PERNICIOSUS* give the following characters of it:—

1. The scale is "gray"; the pellicles "yellow or reddish-yellow," "sometimes black."
2. When on twigs, "the wood beneath the bark is stained red"; "the cambium layer of wood is stained purplish"; the "peculiar reddening effect on the skin is a very characteristic feature"; "the cambium layer frequently becomes deep red or purplish"; "if the twig be scraped with the finger-nail, a yellowish oily liquid will appear."
3. The diameter of the female puparium, or scale, is given by Comstock as about one 13th inch. I do not find it in other writers.
4. The principal food-plant, as mentioned above, is the pear; when the peach is mentioned it is only incidentally, or as very slightly attacked.
5. No mention is made by authors of the second female pellicle as being any larger than the adult female.

Now, in all the foregoing characters, the specimens on which I founded my *AONIDIA FUSCA* differ from *ASP. PERNICIOSUS*; and if one might accept as positively final the statement in "Insect Live" (Vol. VIII., p. 289), that "the San José scale differs from all others in the peculiar reddening effect which it produces," then there would be no more to be said; for *AONIDIA FUSCA* produces, as far as I know, no such effect. In size, *A. FUSCA* is much smaller, the female puparium having a diameter of one 35th inch. In colour it is "very dark brown or dull black;

and again, *A. FUSCA* is decidedly numerous on peach twigs. Lastly, the second female pellicle is larger than the adult insect.

Judging, therefore, by all the external characters (except that of the second pellicle, of which I find no record), *AONIDIA FUSCA* is different from *ASPIDIOTUS PERNICIOSUS*.

But a careful comparison of the adult female insects shows that, with the exception of size, their characters are very similar. My specimens of *ASP. PERNICIOSUS* (originally received from Professor Comstock) average one 25th inch in length; those of *AON. FUSCA* average one 65th inch.

In colour the two agree; also in the absence of any groups of "spinnerets"; also in the terminal lobes, hairs, and indentations of the abdomen. The two last characters are of especial importance; so much so that I am strongly inclined to think that I made a mistake in separating the two insects, at least specifically. The identity of my Australian specimens of *ASPID. PERNICIOSUS* with those from America is absolute; my Australian *AONIDIA* is anatomically very close to both, the principal differences being external.

It remains to discuss the generic character of the comparative dimensions of the adult female and the second pellicle, a character which distinguishes *AONIDIA* from *ASPIDIOTUS*. I have already remarked that I find no notice on this point in any author as to *A. PERNICIOSUS*; but as regards *A. FUSCA* I have no doubt, and I possess a mounted specimen of an adult with the second pellicle still attached, the difference in size being perfectly clear; the pellicle extends all round beyond the adult. Assuming, therefore, that it may be necessary to unite the two insects, and to make *FUSCA* a variety of *PERNICIOSUS* on the ground of anatomical similarity, ignoring the external differences, it will become a question, then, of removing *PERNICIOSUS* from the genus *ASPIDIOTUS* and of attaching it to the genus *AONIDIA*.

It is stated in "Insect Life," Vol. VI., p. 362, that while the origin of *A. PERNICIOSUS* is uncertain, the probability is that it came to America from Japan. I believe that Mr. Koebele is in Japan at present studying the Coccidæ of that country; and he has, perhaps, discovered the native home of this injurious pest. But, in a letter which I received from him a few months ago, he says that the Japanese will not permit any specimens of insects to be sent thence by post; and we must wait till Mr. Koebele himself leaves the country to learn more about this scale. Mr. Benson, of Sydney, however, tells me there have been many fruit trees imported into Australia of late years from Japan.

ON AGROTIS TRITICI, LINN., AB. SUBGOTHICA, HAW., AND
AGROTIS JACULIFERA, GN.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.

I have read with interest the paper by Mr. Slingerland, CAN. ENT., XXVII., p.p. 301-308, and as my name is occasionally mentioned, I trust to the courtesy of our Editor to allow me to reply.

In the first place, I would premise by suggesting that Mr. Grote had more than the bare statement of mine quoted by Mr. Slingerland on p. 302, and was not guided by that alone. He had, I presume, at least seen my notes in the *Entomologists' Record*, and in *British Noctue and Their Varieties*, Vol. II. These Mr. Slingerland appears to have overlooked.

I would point out to American readers that Haworth called his book *Lepidoptera Britannica*, that he described no species knowingly that were not British, and that the onus of proving that he did so rests on Mr. Slingerland, and those who think with him. I would point out also that although Mr. Grote and Prof. Smith may not "have ever seen the original description of *subgothica*," yet I can assure Mr. Slingerland that I had, and that as Mr. Grote, according to his letter, based "his recent revision on the authority of Mr. Tutt," it matters little whether Mr. Grote saw it or not, for he shifts the onus upon my shoulders.

With regard to the species in dispute, I would refer your readers to the quotation referring to the species Haworth described (*vide*, ante. p. 302), in which Haworth says of the species "Habitat in Anglia valde infrequens."* Now, Mr. Slingerland has to face this point. The American species does not occur in England; the species Haworth describes does occur in England; therefore the species that Haworth describes cannot possibly be the American species, by any laws of logic I know.

As Mr. Slingerland says, "No figure of the insect is given"; therefore the whole value of Haworth's name rests on his description. The first question, it seems to me, is not, "Is there anything in it that does not apply to our American insect?" for thus far we have not come to the possibility of its being American, but rather, "Is there any British insect to which it applies absolutely?" and I say, yes! most decidedly, yes! and the insect to which it applies is one of the endless forms of *Agrotis tritici*.

*This was written in 1810, and Mr. Slingerland does not suggest the possible introduction of American specimens into England until 20 years later.—J. W. T.

Mr. Slingerland evidently does not know our British *Agrotis tritici*; it is outside my brief to go into the protean forms it exhibits, but when I say that my series comprises some 2,500 specimens, which have received something like twenty-five different specific names, and a mere summary of these occupies 15 p.p. in *The British Noctue and Their Varieties*, your readers will see that Mr. Slingerland is treading on treacherous grounds when he is dealing with the subject, and suggests that British lepidopterists cannot name their own insects, for this is undoubtedly the ultimate conclusion of his line of argument.

Now, it is quite evident from Mr. Slingerland's remarks (p.p. 302-303) that whatever specimens Haworth (before 1810) described his *subgothica* from, Mr. Stephens (1829) did not describe the same specimens, for he described his from specimens obtained from Mr. Raddon, and the specimens were labelled, "near Barnstaple, Devon." Now, I have to add, as a matter of personal knowledge, that the coasts near Barnstaple, Devon, produce *A. tritici* in immense numbers, and I can assure Mr. Slingerland, and all other American entomologists, that I can match exactly the specimens which Stephens figures, and Humphrey and Westwood copy, with undoubted genuine specimens of *Agrotis tritici*, and I quite agree with my friend, Mr. C. G. Barrett, that these figures certainly represent a variety of *tritici*.

We now come to Mr. Slingerland's first move into the mists of probability, and I would suggest to Mr. Slingerland that probability is not critical science. I refer to Wood's figure, reproduced in the plate, fig. 1b. Mr. Slingerland says:—"I think that a glance at the next figure of the insect that appeared, taken, doubtless, from Stephens's specimen,* will remove all doubt as to what insect Stephens tried to represent." I object absolutely to this premise. There is not a scintilla of evidence to warrant such an assertion. We want facts and deductions therefrom. We do not now, three-quarters of a century after publication, want an assertion made as being "doubtless," without a single fact to support it.

Now, "up to 1847," Mr. Slingerland very rightly observes that English Entomologists considered *subgothica* a British insect, and a distinct species. Then Mr. Doubleday stated that "Haworth's insect is evidently simply a variety of either *Agrotis tritici* or *aguilina*. The species described by Stephens is American." Now, it is strange that I had never noticed this reference before, but it fortifies my position. It

*I have referred to this statement in detail farther on.

must be observed that Doubleday was the authoritative link binding the "Stephens" generation with the present, and his independent opinion alone would not have to be lightly passed over. My own conclusion being at one with his as to *subgothica*, Haw., I take as affording one more link in the strong chain of independent evidence that I have been able to collect. On p. 305, Mr. Slingerland says:—"Curiously enough" (had I been he I should have said 'naturally enough'), "the English authors have claimed Haworth's insect as a variety of their *tritici*. Doubleday said it was 'simply a variety of either *tritici* or *aquilina*,' but it was soon restricted to the former in British lists, and it is still considered as such by Mr. Tutt." In Doubleday's time, *Agrotis tritici* and *A. aquilina* were considered as distinct species, but for the last thirty or forty years it has been well known that *aquilina* is simply a local form of *tritici*, and that the two erstwhile supposed species copulate indiscriminately*. The Continental (European) and British Entomologists have long ago deprived it of specific rank. Therefore, Mr. Doubleday's conclusion and mine are identical.

Mr. Slingerland says that "the evidence in support of considering Haworth's *subgothica* as a variety of *tritici* (or *aquilina*) seems to be confined principally to the simple statement of Doubleday, although Tutt intimates that he has seen Haworth's description." This is really too ingenuous. Haworth's *Lepidoptera Britannica* was the hand book of British Lepidoptera, and in the hands of every British collector until the publication of Stainton's *Manual* in 1858. Every British collector had his "Haworth" then, just as everyone has his "Stainton" now, and I can only hope that this statement will be sufficient to brush out any doubtful remnants of the implied suggestion contained in this remarkable paragraph.

I am totally unable to untangle the line of thought in which Mr. Slingerland has got on p. 303 when he writes:—"For many years after this the name *subgothica* rarely appeared in British lists, and only as a variety of *tritici*; it apparently does not occur at all in recent lists. It has never been taken in England, so far as I can find any record since Stephens's time." Evidently, when our leading lepidopterists had worked out the true position of Haworth's *subgothica*, it would disappear

*For purposes of sale British collectors still keep them separate, and some conservative lepidopterists, who believe nothing they do not see themselves, even write of them as being so.—J. W. T.

from the British lists, for, from that time forth, it ceased to exist as a distinct species, and became naturally a synonym of the older name of the same species *tritici*, Linn., unless the list contained varietal names as well as specific, when *subgothica*, Haw., would naturally fall as a variety of *tritici*, Linn. To say that *subgothica*, Haw., has "never been taken in England since Stephens's time" is absurd, and begging the whole question, for dozens are taken every year (from my point of view), whereas if Mr. Slingerland refers to Guenée *jaculifera*, it, of course, never has been taken in England, neither in Stephens's time, before his time, or "since his time."

We come now to the first introduction of the species into American literature, the year 1856, Mr. Slingerland informs us, and then Dr. Fitch applied to an American species the name *subgothica*, Haw. On what grounds Dr. Fitch did this we cannot tell; evidently he did not know of Doubleday's conclusion in 1847, but I will say this—that the general similarity between some examples of the two species, and the small amount of systematic work which had been done in the American *Noctuae* in 1856, are more than enough to excuse Dr. Fitch for supposing they were identical; nor do I think that Mr. Slingerland scores a point when he states that "no American writer has seriously questioned the identity of our species with the *subgothica* of Stephens and later English writers, or even with the *subgothica* of Haworth until 1891, when Mr. Grote changed his mind in accordance with the opinion of Mr. Tutt." Can Mr. Slingerland wonder at this? What American entomologist had the slightest knowledge of our British *Noctuae*? I will go farther and ask—What American *has*? And now I will execute a bouleversement and ask—What British entomologist knows anything of American *Noctuae*? You may answer, Mr. Walker and Mr. Butler; but Mr. Walker's ignorance was notorious, and the present condition of the *Noctuae* in the British Museum is sufficient proof that Mr. Butler cannot name the commonest British species. The whole thing is too absurd. The name was never questioned, because there was no one to question it.

Now we come to Doubleday's statement *re* "the species described and figured by Stephens is American," and his explanation that he had "traced all the specimens which he had seen of this species (the one described by Stephens) in collections of British Lepidoptera to one source, and I believe the gentleman who distributed them inadvertently mixed a number of the North American insects with his British ones,"

and goes on with a statement that is utterly damaging to "the gentleman's" veracity, or as to his consummate carelessness; but still the unexplained factor remains, viz., that forms of *A. tritici* identical with that figured by Stephens are in many British collections, that the locality given by Raddon is a *bona fide* one for *A. tritici*, and that at a time when there were fewer collectors and few specimens the form figured may not have been well known to Mr. Doubleday.

Now, let us grant for a moment that the variation of *A. tritici* and *A. jaculifera*, Gn., is so closely parallel; nay, so identical, that two specialists at this group, as I suppose Mr. Slingerland and myself to be, cannot see any difference in certain figures claimed for both species—in other words, that what I have no hesitation in referring to *A. tritici*, he has no hesitation in referring to *A. jaculifera*. What bearing, I would ask, has that on Haworth's description? Haworth was dead, and his work was published years before, and he could have had none of Raddon's specimens. He described, evidently, from perfectly different specimens from those used by Stephens. Therefore, even if Raddon fraudulently deceived Stephens, it is clear that he did not deceive Haworth, and until Mr. Slingerland can show some more definite facts relative to Haworth's *subgothica*, he must excuse us if we refuse to change an opinion held by successive generations of British entomologists, viz., that *subgothica*, Haw., is what Haworth described it as, and verily believed it to be, a British and not an American species, and which no one supposed it to be until Dr. Fitch's introduction of the name in America, for, be it observed, the doubt thrown by Doubleday was not on *subgothica*, Haw., but *subgothica*, Stephens. Mr. Slingerland now touches upon what he evidently considers the clinching part of his argument. He asks: "Is Haworth's *subgothica* the same as Stephens's. Probably Haworth's single type specimen could not now be found, if it exists at all." Mr. Slingerland can take the latter for granted. Haworth's type specimen would have been found years ago were it findable. That being so, we are told we must "depend on the original description and a little circumstantial evidence to settle this point." I have before stated that Doubleday and all British authors for almost a century have known perfectly well that Haworth's description refers to a well-known form of *Agrotis tritici*, and the evidence is in favour of this view, but the "circumstantial evidence" must be examined carefully. Mr. Slingerland says that "Haworth's specimen might easily be one which Mr. Barrett recently found in an old

English collection, made up of specimens obtained from older collections by a Mr. Burney, who was contemporary with—and corresponded with—Haworth and others, and many of whose insects fell into his hands." Now, Haworth died about 1830; Burney died in 1893, aged 79 years. At the time of Haworth's death, therefore, Burney was a boy of 16, and his correspondence (if any) with Haworth must have been of the most casual character. Again, Haworth's insects were sold, and Burney would have remembered had he bought it; but boys of 16 do not, as a rule, affect sale-rooms, and at this time Burney was a boy at school. It is on Haworth's sale catalogue, Mr. Slingerland says, so Haworth did not give it to Burney as a result of correspondence. Now we come to "the specimen" mentioned by Mr. Barrett. I also saw the specimen—one of the American *jaculifera*. It had no label, no hint of its origin, and it was present with dozens of other *foreign* specimens, with not the slightest claim to be considered British. Two years ago Mr. Burney's collection was sold. That collection was a marvel. It had been collected just as some men collect "old pots" or "toothpicks." Everything buyable had been bought, and in England, as elsewhere, you can buy anything if you will only pay enough. There were dozens—nay, hundreds of foreign specimens that he had paid big prices for, and obtained with them a British warranty; many of the insects bore well-known lepidopterists' names—some bore my own. So gross was the fraud, that I disowned some of the latter in the sale-rooms. The whole collection was a scientific lie from beginning to end, and among the foreign specimens sold—it was not even labelled or suggested as British—was this American specimen of *jaculifera*. What Mr. Dale surmises is quite beside the question; there are hundreds of people in England who can guess—more, perhaps, in America—and when Mr. Dale ventures, without the slightest shred of evidence, to suppose that it "probably came from Mr. Raddon," his wild guess made of people who lived and died before he was born, helps to cut away the ground from under Mr. Slingerland's feet, for even if every assumption be made that this was a specimen introduced into Britain with a fraudulent design in 1829 (the date of Stephens's *Illustrations*), it could not have been the specimen that Haworth described anterior to 1810; and these are the facts on which Mr. Slingerland "believes that the weight of evidence indicates that the *subgothica* of Haworth and Stephens were the same species." I would only ask, Is this logic, or is it science? if not—what is it?

For a scientific man, Mr. Slingerland must be easily satisfied; but I would urge again that guesswork is not science. I maintain that Haworth's description of *subgothica* refers word for word to a certain form of *Agrotis tritici*. I maintain that Mr. Slingerland has not brought forward one scintilla of evidence to upset Haworth's statement that his species has its "habitat in Anglia; I maintain that Mr. Slingerland has not brought forward the ghost of a fact to assume that *subgothica*, Haw., is or is not even identical with *subgothica*, Steph.

With regard to the latter, I must assume that Mr. Slingerland has had at least as much experience with the various forms of *Agrotis jaculifera* as I have had with those of *Agrotis tritici*, and, therefore, that his opinion is as good as mine; but I still maintain mine, he will maintain his.

Now we come to a matter of expediency. Is it worth while to perpetuate a name about which so much doubt exists? Suppose Mr. Slingerland and myself let our difference die a natural death, the same duel will be fought again and again between our successors, who will view the matter from our respective standpoints.

Now, about Guenée's figure (1d) there can be no doubt. It does not represent any possible form of *Agrotis tritici*. Here, then, is the first unquestioned figure of the American insect. It is the only reasonable name to apply to it, but that is a matter for Mr. Grote and Prof. Smith, and not for me. I simply state facts. *Agrotis tritici*, var. *subgothica*, Haw., is a living fact to me, so is *Agrotis jaculifera*, Gn. For my part I shall continue to write:—

Agrotis tritici, Linn.

ab. *subgothica*, Haw.

2. *Agrotis jaculifera*, Gn.

And Mr. Slingerland can add, if he chooses, to the latter (? *subgothica*, St.). This is what facts warrant, and when we change facts for opinion we are doing a sorry thing for science.

Mr. Slingerland says, p. 303: "This figure, which is reproduced as 1b on the plate [it is enlarged to natural size], is from Wood's *Index Entomologicus*, pl. 9, fig. 149 (1839). All must admit that it is one of the best figures of our American species ever published." I have compared it carefully with the figure from nature, and mark the differences: Wood's figure (1b) may be the best of the figures of the American species ever published, but it represents equally well many specimens of *A. tritici* in my cabinet, and the question arises how far we are justified in considering these as two distinct species at all; whilst for two male specimens of the

same species the abdomina are singularly unlike. Indeed, Mr. Slingerland's references to the figures seem remarkably unhappy, for if Wood's figure is one of the best figures of the American insect ever published, it is singularly unlike the figure from nature above it, and to suppose that Wood's figure (1b) and Stephens's (1a) are from the same specimen seems to suggest great incapacity on the part of one of the artists to reproduce what he saw. Figs. 1 and 1d represent nothing British, but for the remainder there is nothing to add.

I would now draw Mr. Slingerland's attention to an important fact that he has altogether overlooked, viz., the connection between Doubleday and Guenée. It is a matter of history that almost all the N. American species Guenée possessed were obtained from Doubleday and Desvignes, and that most of his work was submitted to Doubleday before publication. It was, therefore, with Doubleday's full knowledge that *jaculifera* was described, and I observe that Guenée in his *Histoire, etc. (Noctuelites)*, Vol. V., p. 262, actually described his *jaculifera*, var. B., from specimens in Doubleday's collection. It is quite evident that with the mutual understanding between Doubleday and Guenée, that Doubleday agreed with Guenée's nomenclature of the American species in 1852, and equally certain, in the face of what he had written in 1847, that he considered the species quite distinct from *subgothica*, Haw.

Mr. Slingerland, in his quotation of my note that "I do not know the American *subgothica*," rather misstates my present position. I have examined all the specimens in the British museum repeatedly since 1891, and know well what I am talking about, and his suggestion that I am an "English writer, who does not know the American insect," is rather startling and far-fetched, and would have been more warranted had Mr. Slingerland written his article five years ago.

One other point only interests me in the note, and in that I am pleased to be able to agree with Mr. Slingerland. There is no doubt Guenée's name, *jaculifera*, refers to the insect known as such; that his var. B. must be called *tricolor*, Lintner, and that his var. B. = *herilis*, Grote. It may be interesting as bearing out Mr. Slingerland's position that Guenée probably had no specimens of *jaculifera*, but that he described Desvignes and Doubleday's specimens; that these Entomologists must have had several specimens is pretty evident, for Guenée writes (*Ibid.*, p. 262): "Amérique Septentrionale; Canada Coll. Div. Paraît très-commune; whilst of var. B. he specially notes: "Etat de New-Yorck, Coll., Dbday."

I have tried to be explicit even at the risk of offending our Editor by being too verbose. I am afraid even now that I may have to explain doubtful points. At any rate I trust I have been logical enough to convince my two good friends, Prof. Grote and Prof. Smith, that on the score of "scientific truth," as well as on the score of "expediency," it is not well that two distinct species should be known in Europe and America by the same name, and that the true name henceforth for the American species—much as I detest upsetting old associations—must be *Agrotis jaculifera*, Gn.

EXOMALOPSIS, A NEOTROPICAL GENUS OF BEES
IN THE UNITED STATES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

The genus *Exomalopsis*, Spin., was founded in 1851 on a couple of bees from Para, Brazil. Three years later, F. Smith described three additional species, also from Brazil. More recently, species have been described or recorded from Cuba, Jamaica, and Mexico, but none hitherto from the United States. One species, *E. pulchella*, Cr., has a remarkable range, being found in Cuba (Cresson), Jamaica (Fox), and Lower California (Fox). I myself have taken it in Jamaica.

The species now described has rather an extensive range in the upper Sonoran zone of New Mexico.

Exomalopsis solani, n. sp.—♀ about 8 mm. long, anterior wing about 6 mm. Black, polished, very shiny, pubescence all pale. Head broad, subtriangular seen from the front, eyes narrow; occiput and cheeks fringed with pubescence, silvery-grayish and subappressed on cheeks; erect, duller, and subochraceous on occiput. Vertex bare, but the occipital hairs extend forward behind the ocelli. Front with copious white hairs, seeming to radiate from the antennal sockets; clypeus and labrum with rather thin yellowish pubescence. Antennæ black, the last half of the flagellum becoming rufous; 2nd joint of flagellum equal with 3rd, or, if anything, rather shorter. Mandibles black; 4th and 5th joints of maxillary palpi of equal length, 6th shorter. In another specimen the 4th joint is clearly longer than the 5th. Glossa reddish, the tip obtuse.

Thorax with rather dense pubescence, except the scutellum, hind half of mesothorax, and dorsum of metathorax, which are bare. The dorsal pubescence is dull yellowish-gray, with even a few black hairs immediately behind the scutellum and at the sides of the mesothorax; on the hind border of prothorax is some dense short pale pubescence, showing through the longer hairs. At the sides of the metathorax and on the pleura the pubescence is whitish. The exposed portions of the meso- and metathorax are practically impunctate, but the pleura is very strongly punctured. Tegulae large, piceous. Wings smoky-hyaline, stigma and nervures piceous; marginal cell long, pointed; 2nd submarginal not half as big as the 1st or 3rd, a little narrowed above; 3rd submarginal narrowed nearly one-half to marginal. Femora and tibiae black; tarsi rufescent. Pubescence of legs whitish, that of tarsi reddish behind. Tibio-tarsal brush of hind legs very large, the hairs very distinctly plumose,

whitish or dull silky white, not at all gray or black, but rufescent on tarsi beneath. Claws very strongly bifid.

Abdomen short, nearly subglobose; bases of segments with sparse silky pubescence; hind margins of segments 2-4 and sides of hind margin of 1st segment with narrow even bands of pure white pubescence, very conspicuous.

Hab.—First found at Albuquerque, N. M., not uncommon on flowers of *Solanum elaeagnifolium* between the old and new towns, Aug. 16, 1895. On Oct. 13 I took one at Las Cruces, N. M., on a plant supposed to be *Flaveria*. Specimens were also taken at Las Cruces by Mr. C. Rhodes, on *Verbesina encelioides* and *Bigelovia Wrightii*, early in October.

Curiously, this insect seems to resemble the West Indian types rather than the Mexican. I sent one to Mr. Fox, who remarks that it "differs from any in our collection by the narrow, continuous, white fasciæ of abdomen, which are more regular than in the related species. From *pulchella* and *similis* it differs by the apparently unicolorous pubescence of hind tibiæ, and again from *similis* by the dorsulum being polished and impunctate medially." The Mexican species nearly all have black pubescence.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

At the annual meeting held in London, on the 27th and 28th of November last, the following gentlemen were elected to hold office during the ensuing year :—

President—J. Dearness, London.

Vice-President—H. H. Lyman, Montreal.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

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Auditors—J. H. Bowman and J. M. Denton, London.

The annual subscription (\$1), now due, should be sent to the Treasurer, J. A. Balkwill, Victoria Hall, London, to whose order money orders or drafts should be made payable.

BOOK NOTICES.

A HAND-BOOK OF BRITISH LEPIDOPTERA, by Edward Meyrick, B. A., F.Z.S., F.E.S., assistant master at Marlborough College. London: MacMillan & Co., and New York, 1895.

This book of 843 pages, illustrated by 104 cuts of venation, describes all the British species of Lepidoptera, 2,061 in number, with descriptions of the genera, families and superfamilies. Full synoptic tables are given, leading down to the separation of species. For the recognition of species, for which it is intended, the work seems admirably adapted. A brief notice of the larva of each species is given, but not enough for identification. What is said, however, is useful and also serves to indicate those species whose life-history is still imperfectly known. The work on the imagoes is stated to be the result of the author's independent observation, but the larval descriptions are compiled. No species are figured. The nomenclature, especially of the higher groups, is occasionally unsatisfactory. There is no synonymy and no references to literature, so that some of the family names are meaningless till after a careful examination of the species included. Some of the changes seem arbitrary and contrary to the rules of priority; e. g., where the Thyatiridæ are called "Polyplocidæ," and the Eucleidæ (= Limacodidæ), "Heterogeneidæ," without any explanation. The spelling of the family names does not conform to the general present custom. A few new genera are described among the Tineids.

The most original and most interesting part of the book is the classification of the Lepidoptera into superfamilies. It differs from any hitherto presented, but is strictly on the lines laid down by recent workers as reviewed by Mr. Tutt (Trans. Ent. Soc., London, 1895, p. 343). Nine superfamilies are created, the lowest, the "Micropterygina," correspond-

ing exactly to Prof. Comstock's Jugatæ, although not elevated to the rank of a suborder. I reproduce the classification in full, adding, in brackets, certain explanations of the family terms.

1. CARADRININA.

Arctiadiæ [=Sarrothripus, Cymbidiæ, Lithosiidæ, Nolidæ, and Arctiidæ].

Caradrinidæ [=Noctuidæ with vein 5 of secondaries weak, and Apatelidæ].

Plusiadæ [=the other Noctuidæ].

Ocneriadæ [=Lymantriidæ and Colocasia (Demas)].

2. NOTODONTINA.

Hydriomenidæ
Sterrhidæ
Geometridæ
Monocteniadæ
Selidosemidæ

[= Geometridæ and
Brepheidæ].

Polyplocidæ [=Thyatiridæ].

Sphingidæ

Notodontidæ.

Saturniadæ.

3. LASIOCAMPINA.

Drepanidæ.

Endromidæ.

Lasiocampidæ.

4. PAPILIONINA.

Nymphalidæ.

Satyridæ.

Erycinidæ.

Lycænidæ.

Pieridæ.

Papilionidæ.

Hesperidæ.

5. PYRALIDINA.

Phycitidæ.

Galleriadæ.

Crambidæ.

Pyraustidæ.

Pyralididæ.

Pterophoridæ.

Orneodidæ.

6. PSYCHINA.

Psychidæ.

Zeuzeridæ [=part of Cossidæ].

Zygaenidæ [=Authroceridæ].

Heterogeneidæ [=Eucleidæ].

7. TORTRICINA.

Epiblemidæ.

Tortricidæ.

Phaloniadæ.

Trypanidæ [=part of Cossidæ].

8. TINEINA.

Aegeriadæ [=Sesiidæ].

Gelechiadæ.

Oecophoridæ.

Elachistidæ.

Plutellidæ.

Tineidæ.

9. MICROPTERYGINA.

Hepialidæ.

Micropterygidæ.

It appears that the superfamilies 5 to 8 correspond to my Tineides, 4 to the Papilionides, 1 to 3 to the Agrotides with the exception of two families under the "Notodontina," the Sphingidæ and Saturniadæ, which

I consider as of superfamily rank. With the exception of these two unwarranted (as I think) associations, there seems little fault to find with the classification. I will leave to Mr. Grote the correction of the family and superfamily names, as he has paid especial attention to the determination of types, and the effects of the application of priority rules. The importance of such work is made very evident by Mr. Meyrick's book, if we are ever to have a uniform and stable nomenclature.

It is evident now that Lepidopterists are practically agreed on the general classification of the Frenate. As to the exact limits of superfamily groups, there is yet, unfortunately, scarcely an approach toward agreement.

HARRISON G. DYAR.

THE CAMBRIDGE NATURAL HISTORY, Vol. V. *Peripatus*, by Adam Sedgwick, M.A., F.R.S., etc.; *Myriapods*, by F. G. Sinclair, M.A.; *Insects*, Part I., by David Sharp, M.A. (Cantab.), M.B. (Edinb.), F.R.S. Macmillan & Co., London, and New York, 1895.

Under this title has been given to the public a work which bears out in every way the deservedly high reputation of the writers. From its style of treatment of the subject, the book may be read with pleasure and profit by general student and specialist alike, while to the instructor who wishes to bring before his pupils the results of late researches, though out of reach of large libraries, it will prove a most valuable aid.

The chapter on *Peripatus*, by Mr. Sedgwick, is in itself a model memoir, and the twenty-six pages devoted to the curious creature are made up for the most part of original studies by the author, who has previously published important monographs on this subject. The historical and morphological matter, which is fully illustrated by fine figures, is followed by a synopsis of all the known species, with notes on their differential characters and geographical distribution—the map which forms the frontispiece of the volume showed them to be confined to the region south of the Tropic of Cancer. The discussion of the affinities of *Peripatus* to the Arthropoda and Annelida is of great interest to the zoologist, whatever his beliefs in regard to the theory of descent.

From Mr. F. G. Sinclair we have the chapter on *Myriapoda*. The preliminary account of these animals contains some charmingly written notices of their habits, and marks the author as a faithful observer in the field as well as in the laboratory. A short sketch of the classification follows, with brief definitions of the families and figures of typical forms,

Several pages which are devoted to the anatomy and embryology of the group, and are embellished by many useful figures, are succeeded by an account of the fossil forms and by a discussion of the zoological position of the class.

Dr. Sharp has taken up the Insecta (Hexapoda) in the third chapter, and nearly five hundred pages are devoted to the general consideration of the subject and a careful review of the Aptera (Thysanura and Collembola) the Orthoptera (inclusive of the Forficulidæ), the Neuroptera (under which name he includes several of the groups given ordinal rank by Brauer, Packard, Comstock, and others) and the lower families of the Hymenoptera. The remainder will follow in future volumes, which the Entomological world will look forward to with much interest. No one who is familiar with the work of the author needs to be assured of its excellence, and it will be sufficient to state that the literary side is fully as well upheld as the scientific. The reader whose knowledge of scientific terms is limited will find that careful attention has been given to making them clear, while the specialist will see that many important points, simply touched upon or slurred over by most text-books and "Natural Histories," are here elaborated by a master hand. The figures of large and bizarre forms of Orthoptera and the accounts in the text of their wonderful adaptation to environment convey a most instructive lesson. A remarkable case of resemblance to an ant is shown by a small Locustid (*Myrmecophana fallax*) which, with a form of body recalling in general that of an ant, is dependent for the "stalk" or pedicel of the abdomen upon a white spot on each side of the body, leaving only a narrow dorsal line dark.

We have not room to speak of all the groups in detail, but mention should be made of the very interesting accounts of the Termites, or white ants. To the inquiring mind, also, the practice of citation of authorities by means of foot-notes must commend itself—this plan being followed throughout the work. The beauty and careful selection of the illustrations deserve special remarks, while the press work is of the best. On the whole, we must consider the enterprise as one meriting the support of every entomologist who cares to see the treatment of his favourites placed in the hands of those competent to properly deal with it and who are able to give us a well-written, thoroughly interesting and reliable guide.

H. F. WICKHAM.

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No. 2.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XIV. THE MELOIDÆ OF ONTARIO AND QUEBEC.

The Canadian species of Meloidæ are few in number, but offer considerable difficulty to the student, chiefly from the fact that some of them are extremely variable in colour and size, while in the genus *Meloe* we meet with a group in which the specific characters have never been accurately determined. The family is characterized by the vesicant or blistering properties of its members (the "Spanish fly" being perhaps the best known in this connection), and, under the name of cantharides, blister-beetles are to be found in every drug store. To the agriculturist they are often a pest, *Macrobasis unicolor* often doing considerable damage to potatoes. The naturalist finds in the curious modifications of the antennæ of the males, a theme worthy of his careful study.



FIG. 1.—Larva of Blistering Beetle.

The larval habits of but few species have been worked out, and these vary somewhat among themselves. The account of the transformations of some European species of *Meloe* has been so often copied in entomological text books that it seems scarcely necessary to reproduce it here. It may be enough to note that the larvæ are hatched as minute six-footed active creatures, which find their way on to the bodies of bees, and are carried in this way into the nests. Here they feed on the provisions and larvæ of the bees, changing their form several times before appearing as pupæ.

Technically, the family characters may be summed up as follows:—

Hind tarsi 4-jointed, the others 5-jointed; anterior coxal cavities open behind. Head strongly narrowed at base into a small neck, front vertical; lateral suture of prothorax entirely obliterated. The base of the prothorax is narrower than that of the elytra, the hind coxæ are large and promi-

ment, and the claws are either cleft or toothed. The chief development of the group in North America is to be found in the regions lying to the westward of the Missouri River and southward of the Platte. Here the species of *Cantharis* and *Pyrota* abound, and, with representatives of several peculiar genera which are unknown in the Eastern districts, give to the fauna a facies which is unmistakable. Some of these Southwestern forms are of considerable size, *Macrobasis longicollis*, Lec., reaching the length of an inch, while *M. atrivittata* is even larger, and is, besides, of great beauty. *Cystodemus Wislizeni*, Lec., is remarkable on account of its form—the elytra being convex and inflated, giving a comical appearance of obesity to the insect. In colour it is of a bright blue, and a more curious species in most respects does not exist in our fauna.

The genera reported from Canada may be readily separated by the following table :—

Elytra short, overlapping along the suture and leaving most of the abdomen exposed. Wings absent.....*Meloe*.

Elytra long, almost or quite covering the abdomen, not overlapping at suture. Wings usually present.

Second joint of antennæ as long or longer than the third ; first joint elongate in the male*Macrobasis*.

Second joint of antennæ shorter than the third, usually not more than half as long.

Antennæ not thickened towards the tip, setaceous, usually much longer than the head and thorax. Surface of body not metallic.....*Epicauta*.

Antennæ scarcely longer than the head and thorax, much thickened towards the tip ; the outer joints short and broad. Labrum deeply emarginate at middle....*Pomphopæa*.

Antennæ extending beyond base of thorax, the joints bead-like in form ; labrum slightly emarginate at middle. Surface of body metallic.....*Cantharis*.

It will be understood that the above characters are not of necessity essential, and that they are intended to apply only to the Canadian forms constituting the genera. Several species of *Cantharis* from other regions are not metallic, and there is a great range of variation in the form of the antennæ. This matter is discussed more fully in Dr. Horn's papers, the titles of which may be found in the bibliography.

MELOE, Linn.

A most difficult genus to treat. The species are clumsy insects with short elytra, which do not cover the large, unwieldy abdomen. They may be found crawling about on low herbage during the cooler portions of the day, or sometimes on flowers; apparently they are most common in autumn and spring. When disturbed they emit a disagreeable fluid from the joints

As one of the species is lacking in our collection, we have applied to Dr. Horn for the synopsis serving to separate the four Canadian forms among themselves.

Thorax evidently longer than wide, sparsely and irregularly punctate.

Elytra rather finely strigose and subopaque; general colour dull blue; head scarcely punctate.....*americanus*, Leach.

Thorax not longer than wide.

General colour black, dull; thorax coarsely punctured and with an impression on basal half of median line.....*impressus*, Kirby.

Blue-black, slightly shining; thorax moderately densely punctate, disk not impressed; elytra not roughly sculptured.....*niger*, Kirby.

Decidedly blue and rather shining; thorax very coarsely, deeply, not densely punctured, disk not impressed; elytra rather coarsely sculptured.....*angusticollis*, Say.

MACROBASIS, Lec.

Contains only one Canadian species, *M. unicolor*, Kirby. (Fig. 2.) The body is black, covered with whitish hairs which give an ashen appearance to the insect. The male differs from the female in having the second antennal joint longer than the third and fourth together. Length, .32-.64 in. Often occurs in such numbers on potato vines as to do considerable mischief.



FIG. 2.

EPICAUTA, Redt.

Four species recorded from Canada are included here. They resemble only the preceding genus in form and may be readily separated from it by the antennal characters. In habits they also resemble *Macro-*

basis, being found commonly on flowers or herbage. We have taken *trichrus* on convolvulus, *pennsylvanica* on golden-rod, *ferruginea* on Helianthus, and *vittata* on various low plants along river banks.

Elytra yellowish with two black stripes. .50-.80 in. *vittata*, Fab. (Fig. 3).
Elytra unicolorous, never striped.

Antennæ scarcely tapering to tip, joints nearly cylindrical.

Colour usually black; head in great part red; varies occasionally in being entirely covered with cinereous pubescence; thorax longer than wide, more densely punctured than the head. .30-.50 in. *trichrus*, Pall.



FIG. 3.

Colour ferruginous or cinereous, owing to the dense pubescence; thorax not longer than wide, not differently punctured from the head; antennæ short. .12-.36 in. *ferruginea*, Say.

Antennæ tapering at tip, joints looser and more constricted or narrowed at base.

Black, coarsely pubescent; head and thorax similar in punctuation. .28-.50 in. *pennsylvanica*, DeG.

POMPHOPÆA, Lec.

P. Sayi, Lec., has been reported from the Sudbury district. It is a greenish insect, .60-.70 in. long, with short antennæ which enlarge towards the tip. The legs are reddish-yellow; the knees, tips of tibiæ and tarsi, dark.

CANTHARIS, Linn.

Two very fine metallic green or bronzed species belong here. They separate best by the use of secondary sexual characters, as made known by Dr. Horn, thus:—

Fifth abdominal segment of ♂ with a broad emargination, which is bisinuate at bottom; lateral lobes rather prominent. Female with hind trochanter subangulate. .64-1.10 in. *Nuttalli*, Say.

Fifth abdominal segment of ♂ with an acute notch at middle, the lateral lobes broadly rounded. Hind trochanters of ♀ not subangulate. .50-.70 in. *cyanipennis*, Lec.

In both of the above species the hind trochanters of the male are armed with a spine at middle, and by this character they may be separated from *C. viridana*, Lec., which occurs in the Northwest Territory. The males here have the hind trochanters unarmed.

In the further study of the Meloidæ the student will find the following works of value :—

1853. Leconte, J. L. Synopsis of the Meloides of the United States. Proc. Acad. Nat. Sci., Phil., VI.
 1866. Leconte, J. L. New Species of North American Coleoptera. Smithsonian Institution. *Pyrota*, p. 159; *Pomphopæa*, p. 160.
 1873. Horn, Geo. H. Revision of the Species of Several Genera of Meloidæ of the United States. Proc. Am. Phil. Soc., XIII.
 1875. Horn, Geo. H. Synonymical Notes and Descriptions of New Species of North American Coleoptera. *Zonitis*, p. 155. Tr. Am. Ento. Soc., V.
 1878. Horn, Geo. H. Contributions to the Coleopterology of the United States, No. 2. *Calospasta*, p. 59. Tr. Am. Ento. Soc., VII.
 1880. Leconte, J. L. Short Studies of North American Coleoptera. Trans. Am. Ento. Soc., VIII. *Nemognatha*, p. 212.
 1885. Horn, Geo. H. Studies among the Meloidæ. Trans. Am. Ento. Soc., XII.

In addition to the above, a few notes on the smaller genera have been published, and certain portions of various larger ones gone over, but these titles have been omitted for lack of space.

THE NORTH AMERICAN SPECIES OF GNATHODUS.

BY CARL F. BAKER, FORT COLLINS, COLO.

The genus *Gnathodus*, as at present accepted, includes forms closely allied to *Cicadula*, but differing in having only two apical cells in the wing. They are of a weaker build than species of *Cicadula*, and a characteristic appearance from above makes them readily distinguishable from any of that genus. The species are very variable and difficult to define. They are small, more or less slender, greenish, yellowish, or whitish Jassids, usually without distinct markings. The ocelli are distant from the eyes. The clypeus usually somewhat exceeds the genæ. The ovipositor rarely exceeds the pygofers. In the United States at least, most of the species are of very wide distribution.

TABLE OF SPECIES.

- A. Head wider than pronotum; vertex not at all produced; colour very pale sordid greenish-fuscous, elytra whitish-subhyaline, sternum black; length, 3-3.25 mm. *abdominalis*.
 AA. Head narrower than pronotum, often much so.

- B. Sternum green or yellow.
- C. Size medium to small; length, 3-4.25 mm.; vertex not strongly produced.
- D. Elytra whitish-translucent; head and thorax pale olive-green; slender; length, 3.5-4 mm. *impictus*.
- DD. Elytra whitish-subhyaline, greenish to yellow on basal two-thirds; head and thorax yellow or yellowish-green; robust, length, 3.75-4 mm. *impictus*, var. *flavus*, n. var.
- DDD. Elytra pale greenish-hyaline; head and thorax green; slender, length, 4.25 mm. *medius*, n. sp.
- CC. Size large; length, 5 mm.; vertex strongly produced; yellowish throughout, with hyaline elytra. *manitou*.
- BB. Sternum black.
- E. Face at least, and usually vertex, pronotum, and scutel, with distinct fuscous markings.
- F. Elytra not distinctly maculated with black; vertex not produced. *confusus*.
- FF. Elytra more or less strongly marked with black; vertex distinctly produced. *punctatus*.
- EE. Face, vertex, pronotum, and scutellum, greenish, without distinct fuscous markings.
- G. Elytra whitish-translucent throughout; veins narrowly greenish; slender, length, 4.25 mm. *occidentalis*, n. sp.
- GG. Elytra pearly-white, green towards the base; veins broadly green; robust, length, 4.5 mm. *Livingstonii*, n. sp.

Gnathodus abdominalis, VanD.

1892. VanDuzee, CAN. ENT., XXIV., p. 113.

1894. VanDuzee, Trans. Am. Ent. Soc., XXI., p. 307.

1895. Gillette & Baker, Prelim., List Hemip., Colo., p. 104.

1895. Gillette, 7th Ann. Rep. Colo. Exp. Sta., p. 60.

Head wider than pronotum. Face a fourth wider than long. Front two-sevenths longer than wide, two and one-sixth times longer than the clypeus. Clypeus broader at base than at tip, sides subparallel or slightly incurved, tip broadly rounded. Vertex evenly rounded, not produced. Pronotum two and one-eighth times as wide as long, length two and a fourth times that of the vertex, hind margin nearly straight, curvature about half of the length. Ovipositor exceeding the pygofers. Hind margin of the last ventral segment in the female apparently slightly

bisinate. Plate in male evenly rounded; valves narrowly, strongly produced, exceeding the plate by twice its length; tips straight.

Colour pale yellowish-fuscous on the head and thorax, the latter sometimes with three faint longitudinal fuscous stripes. Front more or less washed with rufous. Elytra whitish-subhyaline; sternum black. Abdomen above black except margins of segments. Venter yellow. Length, 3 mm.

The above description was prepared from Colorado specimens determined as straight *abdominalis* by Mr. VanDuzee. The distribution of the species in Colorado, as far as determined, is given in Prelim. List Hemip. Colo. In this State it has been recorded from barley and sugar-beet. The species was originally described from New Jersey (Smith). I have before me, also, specimens from the collection of the Ill. State Lab. Nat. Hist., bearing data as follows: June 19, on wheat; July 27; Sept. 17, on wheat.

In the original description, Mr. VanDuzee says of the male genitalia: "Valve large, as long as the two apical ventral segments taken together; apex angled, subacute. Plates but little surpassing the valve, etc." However, in our specimens—determined by Mr. VanDuzee—they are as described above. In this genus, within certain limits, the genitalia are variable in form. Moreover, as among Typhlocybrids, many marked changes are produced in the genitalia by drying, so that most characters drawn from these parts require verification in fresh specimens.

In this species the ocelli are rather nearer to the eyes than is usual in the genus.

Gnathodus impictus, VanD.

1892. VanDuzee, CAN. ENT., XXIV., p. 113.

1894. VanDuzee, Trans. Am. Ent. Soc., XXI., p. 307.

Head narrower than the pronotum. Face one-sixth wider than long. Front two-sevenths longer than wide, twice the length of the clypeus. Clypeus as broad at tip as at base, sides subparallel, tip strongly, evenly rounded. Genæ broad below the loræ. Vertex distinctly produced. Pronotum little less than twice wider than long, length two and a-half times that of the vertex, hind margin distinctly incurved, curvature less than half the length. Ovipositor about equalling pygofer. Hind margin of last ventral segment of female truncate or slightly incurved. Plate in male strongly rounded; valves strongly produced; tips as long as discs, slender, incurved at apex; valves and pygofer with strong white spines.

Colour green, yellowish beneath and on scutel; anterior edge of pronotum and basal angle of scutel with faint indications of rufous. Abdomen above, except margins of segments, black. Elytra whitish-translucent, costa at base sometimes greenish. Length, 3.5-4 mm.

The above description was made from a male and female collected at Lakeland, Md. (F. C. Pratt). These do not fit the original description exactly in the form of the male genitalia, but the difference is not specific and the specimens are otherwise typical. I also have specimens before me from Salineville, Ohio (Cornell Univ. Coll.); Washington, D. C. (Heidemann); Ag. Coll. Miss. (H. E. Weed). Specimens from the collection of the Ill. State Lab. Nat. Hist. bear the following data:—April 23, on rye; May 7, on strawberry; May 9, on blue-grass; June 22, on wheat. The species was originally described from New Brunswick, N. J. (Smith).

Gnathodus impictus, var. *flavus*, n. var.

Slightly larger and more robust than typical *impictus*. Colour yellow or greenish-yellow throughout, including the subhalyne elytra towards the base. Also varying from typical *impictus* in the form of the vertex, face, and male genitalia.

Described from three large series of specimens. The first from Ithaca, N. Y., (Cornell Univ. Coll.). The second from the collection of Mr. Chas. Hart (Illinois:—Acc. Nos. 500-512-514-522-525-526-530-535). The third from the collection of the Ill. State Lab. Nat. Hist., bearing data as follows:—May 15; June 17, on weeds; June 26, on clover; July 2 to 25.

This is one of the most puzzling lot of Jassids that has ever come to my notice. The variation in colour, form, and structure seems extreme, and yet is gradual throughout the whole series. The vertex varies from scarcely at all produced to distinctly produced. The valves in the male vary from not at all produced to the typical form, though the character of the tips is the same in every case. The specimens from Illinois are mostly entirely yellow, though greenish forms occur. On the other hand, those from New York are mostly distinctly greenish-yellow, the yellow forms being rare.

Gnathodus medius, n. sp.

Female: Head narrower than the pronotum. Face about a twelfth wider than long. Front two-fifths longer than wide, length little more than twice that of the clypeus. Clypeus with sides straight, gradually

evenly broadening to a truncate tip, exceeding the genæ more than usual. Genæ of medium width below the loræ. Vertex slightly produced at middle. Pronotum four-fifths wider than long, length four times that of the vertex, curvature little less than half the length, hind margins slightly concave. Last ventral segment truncate, lateral angles curved downward. Ovipositor about equalling pygofer, the latter with scattering short white spines on the apical two-thirds.

Colour yellowish-green. Front with faint indications of one or two transverse arcs. Basal angles of scutellum somewhat darker. Elytra hyaline, with nervures, and costal and inner margins at base, greenish. Sternum greenish. Abdomen above, except margins of segments, black. Length, 4.25 mm.

Pullman, Washington (C. V. Piper). This form is near *impictus*, but is longer and more slender. It also differs in other respects as described above. Larger series from intermediate points, may show it to be but a variety of *impictus*.

Gnathodus manitou, G. & B.

1895. Gillette & Baker, Prelim. List Hemip. Colo., p. 105. Fig.

"Face finely shagreened, a seventh wider than long; clypeus nearly twice as long as broad, rounded at the tip, slightly constricted before the base, basal suture strongly curved; loræ nearly as long and three-fourths as broad as the clypeus; genæ moderately broad, rather deeply depressed beneath the eyes, outer margin angularly incised below the eyes, sharply rounded below, attaining the tip of the clypeus; front one-half longer than broad, twice as long as the clypeus, gradually narrowing below, obtusely rounded above. Vertex one-half longer on the middle than next the eyes, width between the eyes two and one-half times the length at the middle. Pronotum five-sixths broader than long, two and three-fifths times longer than the vertex, curvature two-fifths of the length, posterior margin very slightly concave, anteriorly smooth, posteriorly with scattered feeble punctures, on the posterior median portion finely obliquely rugose, the lines converging backwards. Last ventral segment feebly rounded behind, nearly truncate, pygofer with numerous stout hairs along the whole length. Colour pale green, unicolorous. Elytra hyaline.

"Length, 5 mm. Described from one female.

"Manitou, July (Tucker)."

As this species is only known from the unique type, I quote the original description. The colour should have been stated as yellowish-green instead of pale green.

Gnathodus confusus, G. & B.

1895. Gillette & Baker, Prelim. List Hemip. Colo., p. 104. Fig.

"Face one-fifth wider than long; clypeus twice as long as broad, basal suture strongly curved, somewhat constricted near the base, broadest near the tip; loræ about three-fourths as broad and three-fourths as long as the clypeus; genæ broadly depressed beneath the eyes, margin beneath the eyes inverted, broadly rounded below, moderately broad below the loræ and attaining the tip of the clypeus; front one-fifth longer than broad, once and two-thirds the length of the clypeus, superiorly broadly rounded. Face, vertex, and pronotum finely shagreened. Vertex scarcely longer on the middle than next the eyes, width between the eyes slightly more than four times the length at the middle. Pronotum slightly less than twice as broad as long, length nearly four times that of the vertex, curvature about one-half of length, considerably wider than the head, hind margin slightly concave. Transverse groove of scutellum black. Hind margin of last ventral segment of female truncate. Colour yellowish-green. Face sordid yellow, basal angles of the clypeus with an infuscated spot. Vertex of the same colour as the face, with three indistinct longitudinal smoky bands, the ocelli in light areas. Pronotum light yellowish-green on the anterior and lateral margins, darker green on the middle, two dark brown spots medially just back of the anterior margin, the latter in some specimens entirely obsolete. Scutellum pale yellow, basal angles darker. Elytra greenish-subhyaline, slightly maculate with brown near the clavus, somewhat smoky towards the tip. Tergum black with the apical margins of the segments yellow. Venter yellow with the first two or three segments black at the base, pygofers yellowish. Sternum black. Legs yellowish throughout, with infuscated lines on the outside of the femora.

"Length, 3.75 mm. Described from seven females.

"Pleasant Valley, seven miles north-west of Fort Collins, June 12th; Estes Park, July 12th (Gillette); Steamboat Springs, July 12th, on *Carex* (Baker).

"We have a single female specimen which seems distinct from this species, but to which at this time we hesitate giving a name. It differs as follows: The colour more yellowish. Pronotum distinctly less than twice broader than long. Length, 4 mm.

"Estes Park, July 12th (Gillette)."

I quote the original description. Larger series of this species show some variation from the types. With the exception of two specimens from the collection of the Ill. State Lab. Nat. Hist. (Acc. 1880-4620), I have seen no specimens taken outside of Colorado. This form may eventually prove to be a variety of *punctatus*. In *confusus* the vertex is evenly rounded, not produced, while in *punctatus* it is distinctly produced. *Confusus* also lacks the conspicuous maculation of the elytra. In some specimens the markings vary to a bright fulvous.

Gnathodus punctatus (Thunb.) Fieb.*

1782. Thunberg, Act. Ups., VI., p. 21 (*Cicada punctata*).

1866. Fieber, Verh. d. zool.-bot. Gesell., Wien, XVI., p. 505.

(*Gnathodus punctatus*).

1872. Provancher, Nat. Can., IV., p. 378 (*Typhlocyba rosea*).

1890. Provancher, Pet. Faune Ent. Can., III., p. 300-301 (*Typhlocyba punctata* and *T. jocosa*).

1894. VanDuzee, Trans. Amer. Ent. Soc., XXI., p. 307.

Distinguished by the more or less strongly maculated elytra and produced vertex. Otherwise very closely resembling *confusus*. A careful comparison between series of the American forms referred to this species, and authentic specimens of the European *punctatus*, would be very desirable.

This species is probably widely distributed in the U. S. I have collected it at Ag. Coll., Michigan, and at Fort Collins, Colo., and also have specimens from Ithaca, N. Y. (Cornell Univ. Coll.). There is considerable variation in colour, some specimens having strong pink or roseate suffusion, others being quite strongly green.

Gnathodus occidentalis, n. sp.

Head narrower than pronotum. Face an eighth wider than long. Front about a half longer than wide, and twice the length of the clypeus. Clypeus gradually broadening to the very slightly rounded tip. Genæ broad below loræ. Vertex very slightly produced at the middle. Pronotum about seven-eighths wider than long, three and two-thirds the length of the vertex, curvature seven-fifteenths of the length. Last ventral segment of female truncate at tip. Ovipositor equalling pygofers,

*The synonymy of this species is essentially the same as that given by Mr. VanDuzee in his "List of N. A. Jassoidea." The extended European bibliography I do not attempt to give.

the latter with very short, weak, white spines. Valves of male with long white spines on edges of discs, tips produced into finger-like processes as long as discs.

Colour pale green. Face with faint indications of about three brownish arcs. Basal angles of scutellum yellowish. Elytra milky white, with the veins and costal margin greenish. Sternum black. Abdomen above, and beneath at base, except margins of segments, black. Length, 4.25 mm.

Pullman, Washington (C. V. Piper). This form may prove to be a variety of *medius* on the examination of large series, but it differs in having a black sternum and milky elytra.

Gnathodus Livingstonii, n. sp.

Female: Head narrower than the pronotum. Face a twelfth wider than long. Front a fourth longer than wide, somewhat less than twice the length of the clypeus. Clypeus gradually broadening to the truncate tip. Genæ narrow below the loræ. Vertex very slightly and broadly produced, with a small but distinct pit on either side at base, midway between the median line and eye. Pronotum two-thirds wider than long, about four times the length of the vertex; curvature seven-sixteenths of the length, hind margin straight. Hind margin of last ventral segment truncate. Ovipositor about equalling pygofer, the latter with rather long whitish spines on the apical two-thirds.

Colour bright, rather deep, green. Scutellum yellowish at basal angles. Elytra pearly-white, greenish towards the base, nervures broadly green. Sternum, abdomen above and at base beneath except margins of segments, black. Robust. Length, 4.5 mm.

Corfield, Vancouver Island, B. C. (Mr. Clermont Livingston). This is one of many most interesting things which Mr. Livingston's industry has turned up in Vancouver Island, and I take pleasure in dedicating it to him. It is near *occidentalis*, but is longer, more robust, and differs in coloration.

PROSOPIS SUBTILIS.

Prosopis mesillæ, n. n.

Syn. *F. subtilis*, Fox in litt., Ckll., Tr. Am. Ent. Soc., 1895, p. 295.
(Not *P. subtilis*, Forst.) T. D. A. COCKERELL.

NEW CULICIDÆ FROM NORTH AMERICA.

BY D. W. COQUILLETT, WASHINGTON, D. C.

In the course of identifying the Culicidæ in the National Museum collection and those received by Mr. L. O. Howard from various correspondents, for mention in a paper which he is about to publish, entitled, "Notes on the Life-history of *Culex pungens*, with remarks about other Mosquitoes," three forms were met with which clearly represent new species; and as Mr. Howard desires to exclude all matter of a purely technical nature from his paper, it was deemed advisable to publish the new species in one of our scientific periodicals. Accordingly, the descriptions are offered herewith:—

Culex signifer, n. sp.—♀. Head velvet black, its tomentum silvery-white, the pile black; antennæ, proboscis and palpi black, their tomentum mixed brown and silvery-white, that on apices of palpi wholly silvery. Thorax velvety brownish-black, marked on the anterior half with two silvery-white subdorsal vittæ, and with a silvery-white arcuate lateral line extending the entire length of the thorax; pleura marked with several spots of silvery-white tomentum; scutellum with two spots of similar tomentum on the upper side and one at the tip. Abdomen black, its tomentum violaceous, that at base of each segment white. Legs brown, femora largely yellowish, the tomentum mixed brown and silvery-white, that at apices of tibiæ pure white, each end of tarsal joints white, most extended on the hind tarsi; tarsal claws destitute of teeth on the under side. Wings hyaline, veins yellowish, the scales mixed brown and white; length, 4.8 mm.

District of Columbia. A single specimen, captured by the writer in June.

Near *fasciatus*, Fabr., but the lateral silvery line on the thorax is not strongly bent inward at the middle, and the tarsal claws are not toothed.

Culex tarsalis, n. sp.—♂. Head black, its pile and tomentum mixed brown and white; antennæ brown, apices of joints one to eleven broadly white, the hairs gray; proboscis nearly twice as long as the head and thorax united, naked, black, marked near the middle with a broad white ring; palpi slender, tapering to the tip, brown, the base of each joint white, sides of last two joints and outer side of the preceding one rather long gray pilose. Thorax black, marked with a dorsal gray vitta, tomentum of thorax yellowish, except a white subdorsal undulating line each side, a spot in front of the scutellum, above the root of each wing, and on

the pleura. Abdomen black, a fascia of white tomentum at base of each segment and at apices of the last three. Legs brown, in front and behind covered with white tomentum, bases of femora yellow, both ends of tarsal joints broadly white; front and middle tarsal claws each bearing a tooth on the under side, hind tarsal claws simple. Wings hyaline; scales of veins brown, with a few white ones intermixed.

♀ same as the ♂, with these exceptions: Palpi black, the apex broadly and inner side of apex of the penultimate joint covered with white tomentum; antennæ wholly brown; tarsal claws destitute of teeth. Thorax sometimes yellowish-brown. Length, 4.5 mm.

Argus Mts. and Folsom, Calif. One male and four females in the National Museum, collected by Mr. A. Koebele.

Closely related to *teniorhynchus*, Wied., but in that species the male has a tooth on under side of one tarsal claw and two beneath the other claw, and the female has each front tarsal claw toothed.

Megarhinus rutila, n. sp. — ♂. Head black, tomentum of occiput blue in the centre, white next the eyes; antennæ brown, the first joint covered with blue tomentum on the outer side, that on the inner side silvery-white; hairs of antennæ dark gray, their bases brown; proboscis and palpi black, covered with an appressed blue, golden and violet tomentum. Thorax brown, its tomentum golden-brown and violet, that on the lateral margins pale golden; humeral angle and two large spots on the pleura covered with golden tomentum, scutellum covered with blue, black and violet tomentum. Abdomen black, its tomentum blue, becoming violet at the tip, that on the lateral margins golden, on the venter blue, mixed with a few golden ones; sides of abdomen bearing a few short pale yellow hairs. Legs black, the tomentum mixed blue, violet and golden, that on the coxæ and apices of femora entirely golden; second joint and base of the third of each front and middle tarsi, fourth joint and base of the fifth of the hind tarsi, white; one claw of each front and middle tarsi toothed, the other claws simple. Wings hyaline, costal margin and the veins brown, the scales blue and violet.

♀ same as the ♂, with these exceptions: First joint of antennæ destitute of blue and silvery tomentum; second, third and base of fourth joint of the front and middle tarsi, white; tarsal claws simple. Length, 7 to 10 mm.

North Carolina and Georgiana, Florida. Three males and five females in the National Museum.

Readily recognized by the colouring of the tarsi.

IN REPLY TO CRITICISM.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Mr. J. W. Tutt's article (Trans. Ent. Soc., Lond., 1895, pp. 343-362), reviewed by Mr. Grote (CAN. ENT., XXVII., p. 326), in which he correlates the recent attempts at a classification of the Lepidoptera, is both instructive and stimulating. Mr. Tutt is to be thanked for his useful and impartial criticism. As far as my own work on the larvæ is concerned, the following points are brought out:—

(1) The position of the Pyromorphidæ, Megalopygidæ and Eucleidæ was not found entirely from larval characters, and I am criticised for this. I accept the criticism; but at the time I had no material to prove their position entirely on larval characters. At present I have. Dr. Chapman, with his usual generosity, sent me several species of Anthroceridæ in stage I. (*Anthroceræ loniceræ*, *Adscita statice*, *A. geryon* and *A. globulariæ*), and all show the position of the stage to be such as I assumed for the position I assigned the families to. The Anthroceridæ have a primitive first stage: tubercles i. and ii. approximate, iii. normal, iv. and v. approximate, vi. (and the other thoracic subprimaries) absent, vii. on the leg base. The Pyromorphidæ have not been examined, but must go with the Anthroceridæ (Mr. Tutt's Zygaenidæ). The Megalopygidæ and Eucleidæ (=Lima-codidæ) have no primitive first stage; but I have gotten at the arrangement of their tubercles in another manner. I have shown that the group of smooth Eucleid larvæ have their spinose warts greatly reduced by degeneration. This has proceeded so far that the setæ have reverted to the primitive condition. Not in the first stage, however, for here another peculiar process of extreme reduction has set in, whereby setæ i. and ii. have coalesced at base, forming a Y-shaped process, and in other species one arm of the Y has shortened, leaving apparently a single knobbed seta. But, after stage I. and before the larva is old enough so that the setæ are too small to be well examined, the characteristic high Micro. type of setæ is very evident, in our *Apoda y-inversa* and presumably also in the closely allied European *A. avellana* (*Lima-codes testudo*). The details of the thoracic setæ confirm these conclusions nicely. The Megalopygidæ I assume to go with the Eucleidæ. I have no direct proof for them, as the primitive first stage is wanting, and I have yet to see any degenerate forms.

(2) My failure to divide the Tineina, due to lack of material, is noticed. I have been able partially to remedy this lack (see Journ. N.

Y. Ent. Soc., III., pp. 18-21), but I do not find that the larvæ present any remarkable diversity of structure. Some are exceedingly generalized; so much so as to suggest that they represent the stem form which gave rise to the Noctuina (Agrotides, Grote) as well as to the higher Micros. (Tineides), and I am inclined to confirm Mr. Hampson's remark, quoted by Mr. Tutt (p. 360): "As far as I am able to judge, the Tineidæ represent the ramifications of one branch of the Lepidoptera, some families generalized, others highly specialized, and not a heterogeneous collection of families sprung from various parts of the Lepidopterous tree as the old family Bombyces did."

(3) My position for the Pyralidæ among the true Micros. is shown to be at variance with the conclusions of Chapman and Hampson. This is a real difference, and is only confirmed by further material. In fact, the difference extends, as regards Dr. Chapman's classification, to all his Pyraloid obtectæ, which I have had before me. This is easily reconciled if we may suppose that the obtected pupal character has been developed independently, but in a parallel manner in more than one line of descent. In fact, I think in at least three, for I believe the Sphingides and Bombycides (Saturnians) are derived from a stem ancestral to that of the Tineides and Agrotides, whether the former two superfamilies be closely related or not. At any rate, I am content to let this contradiction stand for the present.

Finally, I would correct a passage in Mr. Tutt's paper where I am unintentionally misquoted (p. 347), apparently from a misunderstanding. I did not intend to imply that the most primitive form of tubercle is found "exclusively in the Jugatæ and Psychidæ," as Mr. Tutt's quotation reads. The original sentence is: "It is found in the less specialized families of all the groups . . . and exclusively in the Jugatæ and in the Psychidæ." As a matter of fact, I separated the Psychidæ thus from a consideration of the supposed homology of tubercles i. and ii. (see Synopsis, Ann. N. Y. Acad. Sci., VIII., p. 203), not from the generalized condition of the setæ, which clearly could not be done, as the original sentence shows. I find now that this separation was due to a misapprehension, and the Psychidæ really fall in with the other Tineides. (Compare *Hyponomeuta cognatellus* for a similar reversal of tubercles i. and ii., by which I was deceived.) However, Mr. Tutt's misinterpretation of the passage does not affect his conclusions essentially.

THE AMERICAN SPECIES OF ISOTOMA.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

The genus *Isotoma*, as far as known, is confined to the Northern Hemisphere and to the more northern part of this region. Thirty-one species are recorded from Europe and Asia, while the same number is recorded in the present paper, from the Eastern United States.

The characters for differentiating the species of *Isotoma* are all drawn from the form of the claws and the apical segment of the spring. In the following descriptions, the larger claw is referred to as the superior and the smaller as the inferior claw. Several species have the superior claw trilobed when viewed from above; the lateral lobes appear as a large tooth along the outer margin of the claw when viewed from the side. The tarsi consist of a single segment. The apices of the tibiae in many species bear long, club-shaped hairs, which are known as tenant hairs. The spring is known technically as the furcula, its basal segment as the manubrium, the middle segment as the dentes, and the apical segment as the mucro. In the following descriptions, the furcula is considered as if extended caudad, the toothed edge being dorsad. The horizontal teeth of the mucro are those having their axis parallel to the axis of the mucro, and the vertical teeth those in which their axis is perpendicular to the axis of the mucro. The teeth are numbered from the apex cephalad. No measurements are given, as they have been looked upon as worthless; the formulæ of the claws and mucro are all that are necessary to recognize the species, young or adults.

I am under obligations to Mr. Samuel Henshaw, Museum Comparative Zoology, Cambridge, Massachusetts, for an opportunity to study the types of Dr. Packard, including all his species except *Besselsii* and *Walkerii*; to Mr. L. O. Howard, Department of Agriculture, Washington, D. C., for type specimens of *Besselsii* and of *palustris*, Muller, from Sweden, determined by Dr. Tycho Tullberg; to Mr. Nathan Banks, Sea Cliff, N. Y., and many others, who have been given due credit for the presentation of specimens.

1. Superior claw without teeth on the inner margin..... 2.
Superior claw with teeth on the inner margin..... 18.
2. Mucro with the first tooth at the base of the second..... 3.
Mucro with the first tooth not at the base of the second..... 8.
3. Inferior claw with a tooth on the inner margin; superior claw without teeth on the outer or inner margins; tibiae without tenant hairs;

- mucro with four teeth, the first at the base of the second, the second and third subequal, the fourth smaller, arising at the side; dentes longer than the manubrium; ocelli sixteen, eight on each side of the head.....4.
- Inferior claw without a tooth on the inner margin, inner margin strongly, roundly, dilated; superior claw without teeth on the outer or inner margins; tibiæ with a single tenant hair; mucro with three teeth, the first at the base of the second, the second and third subequal in length, vertical; dentes twice the length of the manubrium; body brownish, in some specimens with a slight indication of a median dorsal line; legs and furcula yellowish; eye spots black; antennæ twice the length of the head, the apices of the segments purplish, at base greenish. The typical specimens are from Salem, Massachusetts, and Waco, Texas. The Massachusetts specimens belong to *Isotoma viridis*, Bourlet, an European species, while the specimens from Texas are distinct, and Dr. Packard's name is retained for this form*tricolor*, Pack.
4. Dorsum with a distinct median black line.....5.
Dorsum without a median black line.....6.
5. Yellowish, median and lateral black lines distinctly marked, median black line without lateral dilations in the third and fourth abdominal segments. Habitat—Europe, Asia, Africa, and North America**palustris*, Muller.
- Yellowish, median black line with distinct lateral line-like dilations in the third and fourth abdominal segments; sides of the thoracic and abdominal segments clouded, darker near the margin. Habitat—Europe**palustris aquatilis*, Muller.
6. Segments yellowish, with a wide transverse black band, covering the anterior two-thirds of each segment. Habitat—Boreal Europe**palustris balteata*, Reuter.
- Segments entirely of one colour.....7.
7. Entirely dilute greenish, immaculate. Habitat—Boreal Europe**palustris prasina*, Reuter.
- Entirely reddish-violaceous; antennæ and feet blue-black. Habitat—Boreal Europe**palustris fucicola*, Reuter.

*Species not seen.

8. Mucro with the first tooth horizontal, without any tendency towards forming a vertical or subvertical hook..... 9.
 Mucro with the first tooth vertical or subvertical, at least somewhat hooked..... 11.
9. Mucro with two teeth..... 10.
 Mucro with three teeth—the first very short, horizontal, appearing somewhat as when the first tooth is at the base of the second; the second and third, long, vertical, subequal. There is a round knot-like prominence at the base of the mucro, but it is not tooth-like; superior claw without teeth on the outer and inner margins; inferior claw scarcely dilated on the inner margin, with a tooth at middle; dentes twice the length of the manubrium; the furcula reaching the ventral tube; body, legs and furcula, yellowish; eye spot black; antennæ a little longer than the head, purplish at apex. Habitat—Salem, Ohio..... *aequalis*, n. sp.
10. Manubrium longer than the dentes; furcula not reaching the ventral tube; superior claw without teeth on the outer and inner margins; inferior claw with the inner margin not at all dilated, and without teeth; tibiae with two tenant hairs; body mottled grayish, paler at the apices of the segments; antennæ and legs white; antennæ but little longer than the head; body long and slender. Habitat—Fort Collins, Colorado (Carl F. Baker)..... *elongata*, n. sp.
- Manubrium shorter than the dentes, not extending beyond the apex of the abdomen; furcula not reaching the ventral tube; superior and inferior claws without teeth; inner margin of the inferior claw greatly and roundly dilated; mucro with two teeth—the first horizontal and pointedly rounded, the second vertical, of the same length as the first, pointed at apex; body, legs, antennæ, and furcula, white; antennæ not longer than the head. Collected on water drawn from a well. Habitat—Baton Rouge, Louisiana (H. A. Morgan)..... *manubriata*, n. sp.
11. Mucro with two teeth..... 12.
 Mucro with three or more..... 13.
12. Teeth of mucro indistinct; mucro shaped like a portion of the rim of a wagon wheel, the cut end transversely emarginate, the dorsal and ventral corners forming the teeth; the superior and

inferior claws without teeth; the inferior claw dilated on the inner margin; antennæ not twice as long as the head. Habitat—Nova Zembla, Northern Siberia, and

Greenland.....**bidendiculata*, Tullb.

Teeth of mucro distinct, prominent, two first slightly longer than the second, both pointing caudad; superior and inferior claws without teeth; inferior claw of inner margin roundly dilated at middle; furcula reaching the ventral tube; dentes twice as long as the manubrium; body and antennæ blackish; legs and furcula white; antennæ a little longer than the head, the second and third segments dilated at apex. Habitat—Salineville, Ohio.....*parva*, n. sp.

13. Mucro with three teeth.....14.

Mucro with four teeth—the first short, hooked; the second, long, vertical, and about as long as the mucro is wide; the third and fourth subequal to the second, vertical and opposite; superior claw without teeth; the inferior claw without teeth, but with the inner margin broadly, roundly, dilated; furcula not attaining the ventral tube; the dentes and manubrium subequal in length; body and antennæ yellowish, mottled with gray; legs and furcula white; antennæ not longer than the head. Habitat—Dover, Massachusetts (A. P. Morse).....*unica*, n. sp.

14. Superior claw with a tooth on the outer margin, inner margin without teeth; inferior claw without teeth, and the inner margin broadly, roundly, dilated; mucro with three teeth, the first and second of the same length, pointing in the same direction, and in the same line, the third shorter, vertical; furcula attaining the ventral tube; dentes twice the length of the manubrium; body and antennæ brownish-black; legs and furcula white; antennæ a little longer than the head. Habitat—Salem, Ohio.....*communa*, n. sp.

Superior claw without a tooth on the outer margin.....15.

15. Second tooth of mucro shorter than either the first or third, the third as long or longer than the first, all pointing dorso-caudad; superior and inferior claws without teeth; inferior claw somewhat dilated on the inner margin towards the base; furcula reaching the ventral tube; dentes twice the length of the

* Species not seen.

manubrium; body and antennæ dilute purplish; legs and furcula white; antennæ a little longer than the head. This species is paralleled in the European fauna by *Isotoma sensibilis*, Tullb.

Habitat—Salineville, Ohio..... *trispinata*, n. sp.

Second tooth of mucro as long as either the first or third..... 16.

16. Inferior claw without a tooth on the inner margin..... 17.

Inferior claw with a tooth on the inner margin, strongly dilated at middle; superior claw without teeth on the outer or inner margins, the outer margin roundly interrupted at middle; mucro with three teeth, the first long, terminal, evenly curved, and of the same length as the second, the second and third of the same length, opposite, as long as the mucro is wide, and pointing in the same direction as the first; furcula long, reaching to near the ventral tube; dentes very slightly longer than the manubrium; body yellowish; furcula and legs white; antennæ yellowish, apices of the segments purplish; apical segment semi-circular. Habitat—Fredericksburg, Virginia (William D. Richardson)..... *tridentata*, n. sp.

17. Furcula reaching the ventral tube; the dentes twice as long as the manubrium; superior and inferior claws without teeth; inferior claw with its inner margin roundly dilated towards the base; mucro with three teeth, the first tooth distant from the second, making a prominent curve, and pointing dorso-caudad, the second and third vertical, subequal in length, if any difference the third the shortest; body, legs, antennæ, and furcula, white; antennæ slightly longer than the head; eye spots black. It is impossible to distinguish living specimens of this species from the smaller species of *Lipura*, except when they jump. Habitat—Maine, Massachusetts, and New York... *albella*, Pack.

Furcula not reaching the ventral tube; the manubrium distinctly longer than the dentes; superior and inferior claws without teeth; the superior claw wide at base, a short distance from which it is suddenly and greatly constricted; the inferior claw with the inner margin dilated at base, rounded out at apex; mucro with three teeth, the first long, subvertical, distinctly hooked, the second and third of the same length, on opposite sides, and almost opposite; body, legs, antennæ, and furcula, blackish; head elongate; antennæ about as long as the head,

- the first and second segments dilated, as broad as long, and twice as broad as the third or fourth. Habitat.—Polaris Bay.....*Besselsii*, Pack.
18. Superior claw with one tooth on the inner margin.....19.
 Superior claw with two teeth on the inner margin.....33.
19. Superior claw with a tooth on the outer margin.....28.
 Superior claw without a tooth on the outer margin.....20.
20. Inferior claw with a tooth on the inner margin.....26.
 Inferior claw without a tooth on the inner margin.....21.
21. Mucro emarginate at apex, the dorsal angle immediately dorsad of the ventral angle, with two teeth, the dorsal angle being the first, the second of the same length, but more pointed; furcula reaching the ventral tube; dentes twice the length of the manubrium; superior claw with a single tooth on the inner margin and none on the outer margin; inferior claw without teeth, dilated at base, the dilation interrupted before the middle, making a right angle; antennæ and body bluish-black; legs brownish; furcula white; antennæ one-third longer than the head. Habitat—Salineville, Ohio.....*brunnea*, n. sp.
 Mucro not emarginate at apex.....22.
22. Mucro with two or three teeth.....23.
 Mucro with four teeth, the first minute, a mere hook, the second and third of the same length, vertical, as long as the mucro is wide, the fourth slightly shorter than the third and laterad of it, its base in a more dorsal plane, and pointing caudad; furcula attaining the ventral tube; dentes more than twice the length of the manubrium; superior claw with a single tooth on the inner margin and none on the outer margin; the inferior claw without teeth, the inner margin slightly dilated; body and antennæ mottled black; legs and furcula white; antennæ longer than the head. Habitat—Salineville, Ohio.....*synonymica*, n. sp.
23. First tooth of mucro horizontal or subhorizontal.....24.
 First tooth of mucro forming a distinct hook.....25.
24. Mucro with three teeth, the first subhorizontal, broad, the second and third longer than the first, of equal length, one behind the other, pointing cephalad; furcula not reaching the ventral tube; the dentes twice the length of the manubrium; superior claw without teeth on the outer margin and with a single tooth on the

inner margin; inferior claw without teeth, the inner margin broadly, roundly, dilated; tibiæ with two tenant hairs; body dilute black; antennæ, legs, and furcula, dirty white; manubrium scarcely extending beyond the apex of the abdomen; body long and slender; antennæ not longer than the head. Habitat—Dover, Massachusetts (A. P. Morse), and Ithaca, New York.....*dilatata*, n. sp.

Mucro with two teeth, the first horizontal, the second vertical, of the same length as the first; furcula not reaching the ventral tube; dentes slightly longer than the manubrium; superior claw without a tooth on the outer margin, and with a single tooth on the inner margin; inferior claw without teeth, and not dilated on the inner margin; body, legs, antennæ, and furcula, white; manubrium not extending beyond the apex of the abdomen; antennæ of the same length as the head. Habitat—Maine and Massachusetts.....*nivalis*, Pack.

25. Dentes and manubrium subequal in length; furcula not attaining the ventral tube; superior claw without teeth on the outer margin, and with a single tooth on the inner margin; inferior claw without teeth, the inner margin not dilated; mucro with three teeth, all in the same line, the first terminal, minute, vertical, and forming a distinct hook; the second and third as long as the mucro is wide, and pointing cephalad; body, antennæ, and legs blackish-purple; furcula white; antennæ short, hardly as long as the head, the fourth segment longer than the three basal segments combined. Habitat—Salineville, Ohio.....*brevipenna*, n. sp.

Dentes more than twice as long as the manubrium; furcula attaining the ventral tube; mucro with three teeth, the first long, distinctly hooked, not extending dorsad beyond the middle of the second tooth; the second long, pointed, broad at base, about as long as the mucro is wide, and pointing dorsad; the third cephalad of the second, about half as large, and extending dorso-ventrad; superior claw without teeth on the outer margin, and with a single tooth on the inner margin; inferior claw without teeth, the inner margin greatly dilated; body, legs, antennæ, and furcula, snuff-yellow; antennæ about twice as long as the head. In determining this species great care will need to be taken, or

the tooth on the inner margin of the superior claw will be overlooked; it is very faint, scarcely perceptible in some cases. The type specimens of *Isotoma Walkerii* appear to be lost. There is nothing in the description of *Walkerii* to hinder its being united with *Isotoma leonina*. The only definite characters given in the description of *Walkerii* are a comparison of the lengths of the segments of the antennæ. Specimens that are undoubtedly *leonina*, and compared with the types of that species, do not differ from the description of *Walkerii*. A very common species under the bark of recently felled trees.

Habitat—Massachusetts (Packard); Ithaca, New

York..... *Walkerii*, Pack.

26. Tibiæ without tenant hairs; superior claw without teeth on the outer margin, and a single tooth on the inner margin; inferior claw with a tooth on the inner margin; mucro with three teeth—the first forming a blunt, subhorizontal, obliquely rounded end; the second and third of the same length, about as long as the mucro is wide; the third tooth in a higher plane than the second; furcula not attaining the ventral tube; dentes longer than the manubrium; body black, paler at apices of the segments; antennæ dirty white; legs and furcula white; antennæ as long as the head. Habitat—Salineville, Ohio... *obsoleta*, n.sp.

Tibiæ with tenant hairs..... 27.

27. Mucro with three teeth—the first long, distant from the second, and making a distinct vertical hook; the second of the same length as the first, vertical, and in the same line; the third smaller than the second, and not in the same line; furcula attaining the ventral tube; dentes twice the length of the manubrium; superior claw without teeth on the outer margin, and a single tooth on the inner margin; inferior claw greatly dilated at base, dilation squarely interrupted at middle, and with a distinct tooth on the outer angle of the dilation; tibiæ with two tenant hairs; body and antennæ black, paler at the juncture of the segments; legs dirty white, blackish at base; furcula white; antennæ slightly longer than the head; a bristle at the apex of the dentes extends beyond the apex of the mucro. Habitat—Dover, Massachusetts (A. P. Morse)..... *determinata*, n. sp.

Mucro with three teeth, the first horizontal, short, the second and third long and slender, vertical, about as long as the first, and as long as the mucro is wide; furcula not attaining the ventral tube; dentes slightly longer than the manubrium; body and antennæ grayish-yellow; legs and furcula white; antennæ slightly longer than the head. Habitat—Salineville,

Ohio... .. *inclinata*, n. sp.

28. Inferior claw with a tooth on the inner margin 29.

Inferior claw without teeth, the inner margin dilated at base; superior claw with a tooth on the outer margin and another on the inner margin; mucro with three teeth, the first and third of about the same length, the first forming a distinct hook, the second half as long again as either the first or third, all vertical; furcula attaining the ventral tube; the dentes more than twice as long as the manubrium; body and antennæ black; legs and furcula brownish-white; antennæ longer than the head, the segments long and slender. Habitat—Ithaca, New York. *speciosa*, n. sp.

29. Mucro with four teeth 30.

Mucro with five teeth, the first tooth short, one-third the length of the second, the second and third subequal, vertical, as long as the mucro is wide, the fourth shorter than the third and cephalad of it, the fifth very small and laterad of the fourth; superior claw with a tooth on the outer and inner margins; inferior claw with a tooth on the inner margin; furcula reaching the second abdominal segment; dentes distinctly longer than the manubrium; ocelli fourteen, seven on each side of the head; body griseo-violaceous; antennæ about as long as the head, the last segment longest, slightly arcuate. Habitat—St. Lawrence Island, Behring Sea... .. *grandiceps*, Reuter.

30. Mucro with the first tooth distinct, prominent 31.

Mucro with four teeth, the first minute, at the base of the second, the second long, curved, the third and fourth opposite, of the same length as the second; furcula long, reaching the ventral tube; dentes more than twice the length of the manubrium; superior claw with a tooth on the outer margin and another on the inner margin; inferior claw dilated at base and with a tooth on the inner margin; body and antennæ blackish; furcula and legs

* Species not seen.

- white ; body, legs, and antennæ, densely hairy ; antennæ longer than the head. Habitat—Washington, D. C. (Nathan Banks).....*capitola*, n. sp.
31. First tooth of mucro shorter than the second, if as long, subhorizontal.....32.
- First tooth of mucro as long as the second, pointing dorso-caudad, and as long as the mucro is wide, the third and fourth subequal, opposite, and smaller than the second ; the furcula attaining the ventral tube ; manubrium elongate ; dentes twice as long as the manubrium ; superior claw with a tooth on the outer margin and another on the inner margin ; inferior claw dilated, with a tooth on the inner margin ; body and antennæ black and purplish ; legs and furcula brownish ; antennæ paler at base, longer than the head. Habitat—Ithaca, New York, and Salineville, Ohio.....*nigra*, n. sp.
32. Furcula attaining the ventral tube ; dentes twice as long as the manubrium ; mucro with four teeth, the first small, subhorizontal, and with a distinct hook, the first and third of the same length, the second one-half longer than the third, as long as the mucro is wide, the first, second and third in the same line, vertical, the fourth slightly longer than the third, and pointing slightly caudad ; superior claw with a tooth on the outer margin and another on the inner margin ; inferior claw dilated at base, with a tooth on the inner margin at middle ; antennæ and body black ; legs and furcula dirty white ; antennæ of the same length as the head. Habitat—Ithaca, New York, and Salineville, Ohio.....*terminata*, n. sp.
- Furcula short, not attaining the ventral tube ; dentes longer than the manubrium ; mucro with four teeth, the first small, not minute, forming a vertical hook at apex, the second and third of the same length, about as long as the mucro is wide, one cephalad of the other, the fourth smaller than the third, and placed laterad of it ; superior claw with a tooth on the outer margin and another on the inner margin ; inferior claw dilated at base, interrupted at middle, outer angle of dilation with a tooth ; body greenish-white, washed with purplish in places ; antennæ greenish-white ; apices of segments purplish ; legs and furcula white ; antennæ longer than the head. Habitat—Beverly, Massachusetts (A. P. Morse).....*lateraria*, n. sp.

33. Inner margin of inferior claw with a tooth 34.
 Inner margin of inferior claw not with a tooth, inferior claw two-thirds the length of the superior claw; superior claw with a tooth on the outer margin and two on the inner margin; mucro with two teeth, the first forming a distinct vertical hook, the first and second subequal in length, about as long as the mucro is wide; furcula reaching to near the ventral tube; manubrium and dentes subequal in length; body greenish-white, the sides and margins of the segments washed with purplish; legs and furcula white; antennæ of the same colour as the body; apices of the segments ringed with purplish, longer than the head. This species will be easily recognized by the great length of the inferior claw; in all the other species examined the inferior claw is not more than half as long as the superior claw. Habitat—Agricultural College, Mississippi (H. E. Weed). *longipenna*, n. sp.
34. Mucro with three teeth, the first long, forming a distinct hook, the second and third of the same length, opposite, and about as long as the mucro is wide; furcula long, attaining the ventral tube; dentes more than twice as long as the manubrium; superior claw with a tooth on the outer margin and two on the inner margin; inferior claw with inner margin somewhat dilated at middle, with a vertical tooth; antennæ not quite twice as long as the head; eye spots black 36.
 Mucro with four teeth, the first minute, at the base of the second, the second long, forming a hook, the third and fourth opposite, of the same length as the second, about as long as the mucro is wide; furcula attaining the ventral tube; dentes more than twice as long as the manubrium; superior claw with a tooth on the outer margin and two on the inner margin; inferior claw with a tooth on the dilated inner margin; antennæ longer than the head, purplish at apex; eye spots black; body densely covered with long bristles, one or two on each segment much longer than the others 35.
35. Body and legs uniformly grayish-white. Common under bark among the droppings of boring beetles. Habitat—Salem, Massachusetts (Packard); Brazos County, Texas (Nathan Banks); Ithaca, New York. *glauca*, Pack.
 Body white, the segments marked with a broad transverse band of purplish or blue, mottled with paler. Habitat—Franconia, New Hampshire (Mrs. A. Trumbull Slosson). *glauca montana*, n. var.

36. Body yellowish-fuscos, purplish or black without a median black line 37-
 Body in great part greenish-yellow with a distinct median black line.
 Habitat—Europe; Massachusetts (Packard); White Mountains, New Hampshire (Mrs. Annie Trumbull Slosson); Long Island (Nathan Banks); Virginia (Wm. D. Richardson); Ithaca, New York.....*viridis riparia*, Nic.
37. Dorsum, except a few yellowish dots, entirely fuscous. The Massachusetts specimens of *Isotoma tricolor*, together with *Isotoma Belfrageii*, *purpurescens* and *plumbea*, belong to *viridis*, Bourlet. Habitat—Europe; Massachusetts, and Waco, Texas (Packard); Brazos County, Texas (Nathan Banks); Beverly, Massachusetts (A. P. Morse); California (Schott); Ithaca, New York.....*viridis*, Bourlet.
 Dorsum distinctly marked with yellowish..... 38-
38. Yellowish with a distinctly marked wide transverse black band on each segment. Habitat—Boreal Europe...**viridis cincta*, Tullb.
 Yellowish, but not with such a band..... 39-
39. Each segment marked at middle with a loop-shaped mark, the sides of the closed end more distant than those of the open end; the open end at the cephalic end of each segment; the closed end sometimes interrupted; the sides of the segments prominently figured with black. Habitat—Boreal Asia.....**viridis arctica*, Schott.
 Each segment marked with three closed and united deltoid-shaped marks. Habitat—Agricultural College, Mississippi (H. E. Weed).....*viridis delta*, n. var.
- Species that could not be placed from lack of specimens and of figures of the claws and mucrones:—
Isotoma quadrioculata, Tullb.—“*Segmentum tertium abdominis brevius quam quartum. in quo furcula inserta est. Ocelli 4; 2 in utroque latere capitis. Dentes furculæ manubris non longiores, recti; mucrones bidenticulati. Long. 1¼ mm.*” Habitat—Boreal Europe and America. 1872. Tullberg, Sveriges Podurider, p. 48.
Isotoma finctaria, Linn.—“*Segmentum tertium abdominis brevius quam quartum, in quo furcula inserta est. Ocelli nulli. Dentes furculæ manubrio fere duplo longiores, recti; mucrones bidenticulati. Long, 1 mm.*” Habitat—Boreal and Central Europe and Boreal America. 1872. Tullberg, Sveriges Podurider, p. 48.

* Species not seen.



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CEUTORHYNCHUS NAPI OR CEUTORHYNCHUS RAPÆ.

BY F. M. WEBSTER, WOOSTER, OHIO.

In the report of the Commissioner of Agriculture for 1888, p. 136, Miss Mary E. Murtfeldt gives some notes on the development of *Ceutorhynchus napi*, Gyll., which had worked serious injury to cabbage in Missouri, the species having been determined, as stated by Miss Murtfeldt, by the late Dr. C. V. Riley, at that time United States Entomologist. Prior to the publication of Miss Murtfeldt's notice, she had informed me of her "find," and on my writing to ask her if there was not a mistake, and if she did not refer to *rapæ*, she replied that she, too, had not felt sure of the correctness of the determination until she had written Dr. Riley a second time with reference to the species, and the determination had been reaffirmed. This appeared to settle the matter, and I was satisfied that *napi* must be correct, though not before known to occur in North America.

In Bulletin 22, Division of Entomology, United States Department of Agriculture, p. 73, Miss Murtfeldt mentions *Ceutorhynchus rapæ*, Gyll., but does not state whether or not it is the same insect that had been previously mentioned, and there is nothing to imply that such was the case.

In Bulletin 30, of the same series, p. 50, mention is again made of *Ceutorhynchus rapæ*, and this time in a manner that might imply that it was identical with *napi*, but there is nothing definite to this effect, though a correction might have been made in either this or the reference previously cited. Miss Murtfeldt was clearly going by the information given her from the Department of Agriculture, and any errors in that information would not be hers, but of the Division of Entomology, whose place it was to make proper corrections of such, even though of a clerical nature, as a matter of justice to the many who looked to the then United States Entomologist as authority on such matters.

Last May I received young cabbage plants from Montgomery County, Ohio, that were being destroyed by larvæ of some insect burrow-

ing in the stem, especially in the upper portion thereof. I found the larvæ difficult to rear in confinement, and only succeeded in securing one adult from plants removed to the insectary June 14. Correctly supposing that I was dealing with the same species as had Miss Murtfeldt, and overlooking her note in Bulletin 30, I presented the matter in my "Notes of the year in Ohio," at the last meeting of the Association of Economic Entomologists, under the name *C. napi*, Gyll., coupled with the statement that it was not in Henshaw's lists, and in this condition my paper was placed in the hands of the Secretary for publication. My single specimen, reared from affected plants, did not exactly correspond with my specimens of *rapæ*, and remembering the double determination by Dr. Riley for Miss Murtfeldt, and also not at the time having access to the latter's note in Bulletin 30, was led to a conclusion that was, perhaps, not justified, and under different circumstances would not have been arrived at by myself. I had no description of *napi* and a very poor one of *rapæ*, but the work of my larvæ corresponded so exactly with that ascribed to the former species, in Europe, as given in Bargaglia's *Rassegna Biologica di Rincofori Europei*, that I was still further misled.

Before my note went to press, however, I was informed that the old determination of *C. napi* had been found incorrect, that the species was *C. rapæ*, as was probably true of mine. I submitted my single specimen to Mr. Howard, the present U. S. Entomologist, with the request that, if it turned out to be *C. rapæ*, my note should be changed in the proof to correspond thereto. This was all very kindly done, so far as the specific name was concerned (See Bulletin No. 2, New Series, U. S. Department of Agriculture, Division of Entomology, p. 90), but, unfortunately, the statement that "the species is not yet included in Mr. Henshaw's lists of North America Coleoptera," and which was not intended to apply to *C. rapæ* at all, but to *C. napi*, was, through an oversight, allowed to stand, thus placing me in a position that demands an explanation, and which is, here and for this reason, given. *C. napi* is not yet known to occur in America.

In the accompanying plate illustrating the development of *Ceutorhynchus rapæ*, the adult is shown, dorsal view at A, lateral view at B, the larva C, excavation in affected plant in which one or more larvæ may develop at D. The drawings were made by Miss Detmers, under my supervision, and developed at the Department of Agriculture, the electrotype being kindly furnished me by Mr. L. O. Howard.

To Miss Murtfeldt belongs the credit of working out the life-history so far as this is now known, my own observations being only supplementary. Miss M. records the occurrence of larvæ, supposedly belonging to this species, in early spring burrowing in the stems of pepper-grass (*Lepidium virginicum*), and also in the same plant in July, thereby implying at least two annual broods. The injury to cabbage, as observed by her, appears to have been confined to early plants either in hotbeds or soon after having been removed therefrom. In the case of the Ohio outbreak, the attack was among young plants started late for fall and winter use. My attention was not called to the exact trouble until June 4, and both larvæ and adults were taken from these plants July 18, so that I seemed to have been dealing with the second brood. The plants were growing on low ground bordering on a pasture, and the latitude was nearly the same as that of Kirkwood, Missouri, where Miss Murtfeldt's studies were carried on. It is, of course, quite possible that the period of oviposition is protracted, and that I was dealing only with the latter part of the first brood.

REMARKABLE WORK OF INSECTS.

At the meeting (of February 3rd) of the Academy of Science, of St. Louis, Mo. (President Gray in the chair), Mr. Trelease exhibited several specimens, about three feet square, of a curious silk tapestry, taken from the ceiling of a corn-storing loft in San Luis Potosi, Mexico, by Dr. Francis Eschauzier, stating that he was informed that the larger specimen had been cut from a continuous sheet over twenty yards wide and about four times as long. The specimens, of a nearly white colour, and of much the appearance and feeling of a soft tanned piece of sheepskin, were shown to be composed of myriads of fine silken threads, crossing and recrossing at every conceivable angle, and so producing a seemingly homogeneous texture. Although specimens of the creatures by which they are produced had not been secured, it was stated that there was no doubt that these tapestries are the work of lepidopterous larvæ which feed upon grain, the presumption being that they are made by the larvæ of what has been called the Mediterranean Grain or Flour Moth (*Ephestia Kühniella*). The speaker briefly reviewed the history of this insect and its injuriousness in various parts of the world, and quoted from a report of Dr. Bryce, showing that in Canada, where it became established in 1889, "a large warehouse, some 25 feet wide, 75 feet long, and four stories high, became literally alive with moths in the short course of six months." WILLIAM TRELEASE, *Recording Secretary.*

A FEW NEW SPIDERS.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Micaria gentilis, n. sp.

Length, 3.6 mm.; ceph.: long, 1.4 mm.; broad, 1 mm. Cephalothorax, sternum, femora i. and ii., blackish; rest of legs i. and ii. pale yellowish; legs iii. and iv. yellow-brown, the femora scarcely darker; abdomen black above, with a narrow white band across the middle and a white spot on each anterior lower side; venter pale. Cephalothorax broad, in ♂ a little narrower; posterior row of eyes procurved, the P. M. E. oval, fully their diameter apart, and about as far from the P. S. E.; anterior row strongly procurved, the A. M. E. fully their diameter apart, and about as far from the larger A. S. E. Sternum oval, pointed behind; legs of moderate length, femora i. and ii. stouter than others, femora iii. slightly excised before the tip behind. Abdomen not constricted, quite broad, somewhat depressed, epigynum appearing much like *M. montana*, Em., but the openings are farther apart and more oblique. Tibia of ♂ palpus has short projection at tip on the outer side; the bulb is triangular in side view, the red parallel marks are along the outer edge; near the middle is a short tube.

Several specimens from Franconia, N. H. [Mrs. Annie T. Slosson]. Related to *M. perfecta* from Colorado, but larger and with a broader sternum.

Scius montanus, n. sp.

Length, 2.1 mm.; ceph.: long, 1 mm.; broad, .6 mm. Jet black, shining, almost coppery; extreme tips of palpi, tips of maxillæ, a spot on each coxa and trochanter, and an elongate spot on the femur, pale; the tarsi infuscated; pale dots on legs at origin of hairs. Cephalothorax long, moderately low, nearly flat, sides almost parallel. Eye region one-third broader than long, occupying not much over one-third of the cephalothorax; a trifle broader in front than behind; eyes of second row full as close to the dorsal eyes as to lateral eyes; A. M. E. large, distinctly separated, plainly farther from the S. E. Sternum one-fourth longer than broad, broadest in middle, pointed behind, truncate in front; coxæ i. separated by full width of lip; legs short, fourth pair longest, femora i. thicker than others; only a few indistinct spines, those on metatarsi iv. are at apex. Abdomen barely wider than cephalothorax and but little longer, pointed behind. Body and legs clothed with scattered black hairs. The ♂ palpi short, the tibia with a short process on the

outer side, twice as long as wide, and appressed to the tarsus so as to be hardly visible except in side view; palpal organ very large, with the lower part full and extended over the base of the tibia; on the outer side near tip is a crescent-shaped yellowish mark; the bulb is small and on one side, and is tipped with a minute spine-like tube.

One ♂, Mt. Washington, N. H. [Mrs. Annie T. Slosson]. A very distinct little species, and doubtless peculiar to mountains.

Dismodiscus alpinus, n. sp.

Length, 2 mm. Cephalothorax pale yellowish, blackish around eyes, sternum infuscated, abdomen dark gray, legs almost white. Structure somewhat like *Loph. decem-oculatum*, Em., with a large lobe on the clypeus as in that species, but the lobe on the head is higher, narrower, rounded above, not bilobed, clothed with short hairs on top and in front, and rises suddenly from the surface of the cephalothorax in front and behind; the P. M. E. are on the cephalothorax at its base, and not on the lobe; the holes are in a large groove on each side. The posterior row of eyes is straight, equal in size, the P. M. E. fully as far from each other as from the S. E.; the anterior row is slightly recurved, the A. M. E. very small and close together. Sternum but little longer than broad, truncate at base, pointed behind, sides rounded. Legs slender, a spine above on patella and two on tibia iv., tarsus i. plainly shorter than the metatarsus. The tibia of the ♂ palpus has above two short spines and two projections at its tip, the outer one the broader and pale, the inner one more pointed and reddish; the palpus is barrel-shaped, the tube going once around the tip as in *Diplostyla*; there is a large curved hook at base.

One ♂, Mt. Washington [Mrs. A. T. Slosson]. Although this species does not strictly agree with Simon's description of the genus *Dismodiscus*, I believe it should go here, as also *Loph. decem-oculatum*, Em. The best character for the genus to me is the clypeal lobe.

Dicyphus, Menge, which Simon unites to *Gonatium*, I would agree with Kulezynski in keeping as a separate genus, and closely related to *Dismodiscus*. The head of the ♂ has a lobe above which does not bear the P. M. E.; there is no clypeal lobe. I have seen two species from the United States, the first of which has much affinity with the type of the genus, *D. bituberculatus*.

Dicyphus bilobatus, n. sp.

Length, ♂, 2 mm. Cephalothorax orange, a little black around the

eyes, the lobe on top yellow, a black line from the hole on each side; abdomen blackish above and below, the spinnerets pale, sternum yellowish, legs and palpi pale, clothed with fine hairs. Just behind the eyes is a large bilobed body with a hole at base each side; seen from above each lobe is elliptical, and scarcely twice as long as broad, shorter than in *D. bituberculatus*. Posterior row of eyes nearly straight; P. M. E. once and a half their diameter apart, slightly farther from the S. E.; A. M. E. very small and about touching. Sternum as broad as long, triangular; legs moderately long, no spines above on tibiae, tarsus i. shorter than metatarsus. The tibia of ♂ palpus has a long projection above near tip, much as in *D. bituberculatus*, but it is more slender, more straight and but little curved at tip; on the outer side of tibia is a very small hook-shaped appendage; the tube is moderately long, bent in the middle, and the tip supported by a hyaline sheath. The palpi are comparatively small.

Two males, one from a deep swamp near Ithaca, N. Y., the other from Olympia, Wash. [Trevor Kincaid].

Dicyphus trilobatus, n. sp.

Length, ♂, 2 mm. Cephalothorax yellow-brown, black about the eyes, lobe yellow; abdomen black, with a few light cross-lines near tip; sternum and venter black; the spinnerets pale; legs and palpi yellowish, a little brown on the coxae. Posterior row of eyes straight; P. M. E. twice their diameter apart, much closer to the S. E.; A. M. E. close together, not so very much smaller than the S. E. Just behind the eyes is a large triangular flat body, trilobed in front, the lobes of about equal size. The sternum is broad, projecting between the hind coxae, the sides rounded. Legs moderately long, hairy, no spines on tibiae. The ♂ palpi are long and slender, the tibia has above a large bifid process; there are two tube-like pieces: one, starting from near the middle of the bulb, bends out and then toward the tip of the palpus; the other, starting from near the inner tip of bulb, extends toward the base of the first one; on the outer side there is a quite prominent pale-coloured projection—it is somewhat like a sheath or support for the tube.

One specimen from Ithaca, N. Y.

The genus *Erigonoplus* has the head lobed as in the preceding genera, but differs from them at once in having the anterior metatarsi of the male swollen.

Erigonoplus gigas, n. sp.

Length, 2.2 mm. Cephalothorax yellowish, black around the eyes and on the clypeus; legs and palpi pale, patellæ of legs a little darker; abdomen blackish, with narrow pale chevrons above, spinnerets pale; sternum yellow-brown. Head broad and swollen in front; posterior row of eyes slightly procurved; P. M. E. nearly twice their diameter apart, about as far from S. E.; A. M. E. far in front of P. M. E., small and close together. Behind the eyes there is a small, low, yellow body, trilobed in front and with a smaller lobe on each side. The legs are long and hairy, without spines above; metatarsi i. much enlarged in the middle, fusiform. The sternum is short, pointed between the hind coxæ, fully as broad at coxæ ii. as in front. The tibia of the ♂ palpus has on the outer tip a short, stout projection; a large hook across basal part of bulb with a projection outward from it; the tube starts from near the middle, curves along the bulb to the tip, then extends outward and curving, so as to nearly form a square.

One male from a deep and cold swamp near Ithaca, N. Y. (May).

A REPLY CONCERNING NOCTUA AND AGROTIS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Prof. John B. Smith on page 8 of this volume criticizes my rejection of the terms *Noctua* and *Noctuidæ* and says: "I state my own knowledge as follows: In Scudder's 'Nomenclator' we find

"Noctua, Klein, Moll., 1753.

Noctua, Fabr., Lep., 1776.

Noctua, Sav., Aves., 1809.

Noctuæ, Linn., Lep., 1758."

I may say, that were this "knowledge" the utmost we could attain to, my statement that "*Noctua* is preoccupied in the Birds" would be justified. The term "*Noctuæ*, Linn.," 1758, is, according to Prof. Smith, to be rejected and the generic term is to be credited to Fabricius, although Guenée and others write "*Noctua*, Linn.," so that the date 1758 would be ruled out. The citation "*Noctua*, Fabr.," 1776, if looked up, would show that it represents a bare name, and therefore [see Comstock's observations] this would also fall. We would then come to Savigny, 1809, and this would be the proper use under the rules, according to the "Nomenclator" as cited by Smith, of the name "*Noctua*." But while Prof. Smith's knowledge, as above stated, justifies me, it is not final.

Prof. Comstock finds that Fabricius in 1792 uses "Noctua" for 380 species, and this is not in the "Nomenclator." More than this, I have found that Fabricius uses the term "Noctua" for 309 species already in the Mantissa, 1787.* So that we are getting more light and more facts, and it may be that my rejection, although warranted by the "Nomenclator," may have to be reconsidered. But there remains the fact that the type is unknown [pending what we may hope to hear from Mr. Kirby's researches] and, also, that no author is obliged to use a generic term which has not a properly designated type. In this case I have shown at least the necessity for reviewing Guenée's statement, that *his* genus "Noctua" is a proper restriction of the Linnean term.

And now as to *Agrotis* and Prof. Smith's statements on page 6. He does not quote my full text on p. 16 of the Bremen List, where I show that he copies the sense and as near as may be my words as to the characters on which we may divide the genus, without any acknowledgment. He excuses the omission now by the "bald statement" that the contents of my paper† were not "in any sense of the word original," and that Lederer used the characters in his work on "the European Noctuids so long ago as 1857." This is the first I have heard that Lederer had worked up the American *Agrotids*; it would have spared me much trouble had it been so. In reality Lederer only discusses the European species, and my work on the American and my suggestions as to the characters to be found serviceable was in so far original. But the statement that the characters proposed and observed by me were not "original" seems incorrect. First: Lederer does not propose to use the unarmed fore tibiae as an excluding character. He alternates groups of the species with armed and unarmed tibiae.‡ So that I should have been credited for this original suggestion. Second: I am the first to discover the tuberculate front in *Agrotis*; this discovery is "original" and it does not detract from its originality that I only applied *Carneades* to the two species which I examined and only could examine at the time of my discovery, I being then very ill and having parted with my collection. That some of the European species probably have the tuberculate front is implied by Prof. Smith when suggesting that *Chera* should replace *Carneades*. But Lederer does not mention the clypeal tubercle or elevation at all.

* Grote, Die Apateliden, Mitt. Roem. Mus. San., 1896.

† CAN. ENT., XV., 51, 1883.

‡ Lederer, Syst. Noct., p. 81. I have constantly in my writings given Lederer every credit for his observations on the characters in this family.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XV. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC.

The above family is of immense extent and attains, in the tropics, a considerable development in the size of its members, though not equalling in this respect its wood-eating neighbours, the Cerambycidæ. Towards the north, many groups fade out entirely and the large or gaily-coloured species decrease in number. Nevertheless, the representation in Canada is quite considerable, and since many of the species are closely allied and separate with some difficulty, while tables of genera are widely scattered, or, in many cases, not readily accessible, it has been deemed worth while to bring together the salient characters by means of which the collector in Eastern Canada may hope to identify his captures.

According to the classification followed in this country, the members of the family agree in these points: The tarsi are broad, spongy beneath, the fourth and fifth joints being so closely ankylosed as to give the appearance of but four joints; the head has the front small and oblique, the antennæ are moderate or short and not inserted upon frontal prominences. The prothorax is most frequently margined and the tibial spurs usually wanting. A few exceptions occur to each of the above characters, but most of the Chrysomelidæ may easily be recognized at sight by their resemblance to a few common types, such as *Donacia*, *Cryptocephalus*, *Chrysochus*, *Chrysomela*, *Galeruca*, *Haltica*, *Micro-rhopala* and *Cassida*. There is, however, no uniformity of family habitus, as many of the Cassidini are extremely broad and flattened, while the Cryptocephalini are occasionally nearly globular.

All of the Chrysomelidæ may be said to be vegetable feeders, and most of them are to be found in every stage upon the leaves, in the stems or about the roots of their food-plants. The larvæ are not of a very uniform type of structure, but are modified to suit their particular habits of life. Most of those that feed freely upon the surface of leaves are of rather heavy, subcylindrical or subglobular form and slow in movement. A good example of this type is to be seen in the young of the Colorado potato-beetle. Other leaf-eating larvæ, such as those of *Coptocycla* and its allies, are flattened and curiously armed with spines or covered with a coat of their own excrement. The leaf-mining or stem-boring kinds are usually of more slender, elongate shape and without the conspicuous

ornamentation displayed by so many of the free-feeding forms. A few are case-bearers and occur either at large on their food-plants or in nests of ants; to this category belong *Coscinoptera* and *Chlamys*. The larva of *Chlamys plicata* occurs commonly on grasses in the Lake Superior district, carrying its little case about and protruding only the front part of the body when feeding or crawling. When the inhabitant is ready to pupate, the open end of the case is sealed to a blade of grass and the transformations take place within.

The economic importance of the group has been recognized by all Entomologists, and certain species claim their share of our crops from year to year in spite of the constant war waged against them. The imported elm-leaf beetle, the Colorado potato-beetle, the corn-root worm, and the striped cucumber-beetle are only a few of the many injurious Chrysomelidæ which have to be fought each year in the regions which they infest.

Secondary sexual characters are to be found in the antennæ, the tarsi, the claws, and the ventral abdominal segments of many species, and are often of great value in the separation of otherwise almost indistinguishable forms. These will be referred to in the proper places when necessary for identification.

On account of the great size of the family, it seems best to avoid a long, complicated generic table by the adoption of the groups indicated in the Leconte and Horn "Classification." Each tribe will be taken up by itself and the genera contained in it separated by a table. A slight modification of the tabular synopsis presented in the work above cited may be used to advantage as follows:—

- A. Outline of body elliptical or nearly circular; prothorax and elytra with broad expanded margins, head concealed. . . . XI. *Cassidini*.
- AA. Outline of body variable, prothorax and elytra without broad expanded margins. Head usually plainly visible from above.
 - b. Front of head inflexed, mouth inferior, body wedge-shaped, broad and truncate behind. X. *Hispini*.
 - bb. Front of head not inflexed, mouth anterior.
 - c. Last dorsal abdominal segment not exposed, middle ventral segments not narrowed.
 - d. Prothorax usually margined.
 - e. Antennæ approximate at base; front coxæ conical and prominent IX. *Galerucini*.

- ee. Antennæ widely separated at base.
 Front coxæ transverse, third tarsal joint usually
 entire VIII. *Chrysomelini*.
 Front coxæ rounded, third tarsal joint
 bilobed VII. *Eumolpini*.
 dd. Prothorax not margined at sides.
 f. First ventral about as long or somewhat shorter than
 the two following.
 Claws simple, elytra punctato-
 striate III. *Criocerini*.
 Claws cleft or toothed, elytral punctures
 irregular II. *Sagrini*.
 ff. First ventral about as long as all the others
 united I. *Donaciini*.
 cc. Last dorsal abdominal segment exposed, declivous. Form
 of body robust, compact, subcylindrical.
 g. Surface of body coarsely tuberculate
 above V. *Chlamydini*.
 gg. Surface of body not tuberculate.
 Prosternum not separating front coxæ; antennæ
 short and serrate IV. *Clythrini*.
 Prosternum extending between front coxæ, antennæ
 usually long and slender VI. *Cryptocephalini*.

The Roman numerals before each tribal name show the order in which they are taken up in the following pages.

TRIBE I.—DONACIINI.

Contains two genera, which are composed of very neat, graceful and usually active species, found on or about such aquatic or subaquatic plants as water-lilies, arrowheads (*Sagittaria*), pond-weed, and various sedges. They have a habitus peculiarly their own, which if once appreciated renders their future recognition easy at a glance. The head and thorax are narrower than the elytra, which are attenuated toward the tip—sometimes almost triangularly so. The antennæ are rather long, extending back beyond the base of the thorax; the under surface of the body is finely pubescent. In colour most of the species are metallic, varying to blue or green, though a few are testaceous, at least in part.

Elytra simple at tip *Donacia*.

Elytra distinctly spinose at tip *Hæmonia*.

DONACIA, Fabr.

Numerous Canadian species are known, which, from their general uniformity of appearance, are often difficult to identify. Careful attention to the points recently elaborated by Mr. Chas. W. Leng, and published by him in a late paper on the genus, should result in correct names, however. The following table is based on that of Mr. Leng, though I have changed the arrangement somewhat, in order the sooner to eliminate the more easily recognized species:—

- A. Head, thorax and elytra pubescent. .40-.44 in. . . *pubicollis*, Suffr.
- A A. Head and thorax pubescent, elytra glabrous.
 - .36-.44 in. *hirticollis*, Kirby.
- A A A. Head sometimes, thorax and elytra never, pubescent.
 - b. Elytra distinctly rounded at tip; form convex.
 - c. Thorax depressed, no median nor basal line.
 - .24-.32 *pusilla*, Say.
 - cc. Thorax convex, basal line distinct, longitudinal one usually so.
 - d. Legs dark; body usually metallic blue.
 - .24-.28 in. *emarginata*, Kirby.
 - dd. Legs reddish-yellow. Body usually copper-bronzed.
 - Thorax thickly punctured. .28-.36 in. *flavipes*, Say.
 - Thorax sparsely punctured. .26-.30 in. *rufa*, Say.
 - bb. Elytra truncate or subtruncate at tip.
 - e. Middle coxæ separated by about their own width; body broad, distinctly flattened above.
 - f. Second and third joints of antennæ nearly equal.
 - .28-.44 in. *cincticornis*, Newm.
 - ff. Third joint of antennæ much longer than second.
 - Elytra truncate at tip. First ventral ♂ simple.
 - .36-.44 in. *palmata*, Oliv.
 - Elytra subtruncate at tip. First ventral ♂ with a pit at middle. .26-.40 in. *piscatrix*, Lac.
 - ee. Middle coxæ separated by less than their own width.
 - Body usually convex above, narrower than in preceding group.
 - g. Prothorax scarcely tuberculate at sides, surface with coarse uniform punctures.
 - .28-.44 in. *subtilis*, Kunze.

gg. Prothorax tuberculate at sides, disk uneven.

Sutural margin of elytra not sinuate, disk with two transverse indentations. .22-.28 in. *aequalis*, Say.

Sutural margin of elytra sinuate near the tip. .28-.36 in. *distincta*, Lec.

It will be noted that several of the names on the Canadian list do not appear in the above table. These have been reduced to synonymy by Mr. Leng, as follows: *D. cuprea* becomes *pusilla*, *D. rugifrons* gives way to *emarginata*, *D. jucunda* to *flavipes*, and *D. Kirbyi* to *rufa*.



FIG. 4.

Both *proxima* and *magnifica* are considered by him to rank only as varieties of *cincticornis*, *proxima* having the prothorax punctate only at base and apex, while in *magnifica* it is coarsely punctured over the whole surface. He reduces (with an expression of doubt) *torosa* to a varietal form of *distincta*, from which it differs by Dr. Leconte's description in being of a blackish-violet colour and in having the prothorax somewhat elongate, while the same author describes his *distincta* as coppery, with the thorax quadrate. It is a matter of remark that Mr. Crotch should have placed these forms in different and

apparently well-founded divisions in his synopsis, while Mr. Leng thinks them only varietal. Fig. 4 shows the form of body common in the genus.

HÆMONIA, Latr.

The only North American species is *H. nigricornis*, Kirby, which resembles a small *Donacia* in form. Beneath, the body is blackish, the upper surface and the legs are reddish-yellow. The head, antennæ and tarsi are dark. The elytra are marked with ten long rows of punctures and a shorter one near the suture at base. Length, .20-.28 in. It is said to occur on *Potamogeton*.

TRIBE II.—SAGRINI.

The few species comprised in this group are remarkable for the plasticity of their characters and the difficulty of accurately defining their limits of variation. They are of small or moderate size and agree in having strongly punctured elytra, which are wider than the thorax. The mouth is rather prominent, the eyes very convex, giving the head a width

about equal to that of the thorax. The antennæ are moderately distant at base. The armature of the thorax will serve to differentiate the Canadian genera thus :—

Sides of prothorax much rounded and rather suddenly narrowed behind, giving a somewhat bell-shaped appearance. *Orsodachna*.
 Sides of thorax with large, distinct tubercle; small species. *Zeugophora*.
 Sides of thorax broadly angulate, more or less distinctly three-toothed; larger species. *Syneta*.

ORSODACHNA, Latr.

A single species of extreme variability (*O. atra*, Ahr.), belongs here. It is common on willow blossoms in spring, several colour-varieties often occurring together on the same tree. All intergrades are known, from entirely blackish individuals, through forms in which the thorax becomes red, with or without a central dark spot, to those with vittate elytra or even of an almost uniform testaceous. From the notes of Dr. Horn, the following key has been constructed as a guide to the best-marked varieties, but it must be borne in mind that numerous intergradations will be met with, not referable to any of these :—

A. Elytra blackish.

Thorax blackish, legs dark. *atra*, Ahr.
 Thorax blackish, tibiae and femora testaceous. . . . *tibialis*, Kirby.
 Thorax reddish, with central dark spot. *luctuosa*, Lec.
 Thorax entirely red. *hepatica*, Say.

AA. Elytra vittate or spotted.

Elytra dark, each with narrow yellow stripe. *vittata*, Say.
 Elytra yellowish, with sutural and lateral dark stripe. *trivittata*, Lac.
 Elytra dark, with humeral and apical yellow spot (Fig. 5). *Childreni*, Kirby.

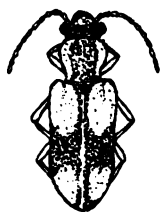


FIG. 5.

In general, they agree in these characters: The prothorax is somewhat bell-shaped, rather coarsely punctured, less so at the sides; the elytra are broad at base and with numerous closely placed, rather coarse punctures which show some slight tendency to a serial arrangement. Sides of elytra nearly parallel to about the apical third, whence they are rounded to tip. Length, .16-.28 in.

ZEUGOPHORA, Kunze.

Three are reported from Canada. They are small insects, somewhat of the form of *Orsodachna*, but proportionately shorter and more robust. The punctuation, especially of the elytra, is coarse and the prothorax has a large tubercle on each side. *Z. abnormis*, Lec., is black above, the antennæ and legs red; it reaches the length of .16 in. *Z. varians*, Cr. (Fig. 6.), is a trifle smaller (.13-.14 in.), and rather prettily coloured, the thorax being mostly piceous above, with a yellowish median stripe; the elytra are dark around the margins, the disk being occupied by a large oval or somewhat heart-shaped yellowish spot. Specimens of *Z. varians* from the Pacific slope seem tolerably constant in having the median yellow stripe of the thorax obliterated and the sides more broadly pale, while the elytra have, in addition to the usual spot, a smaller common sutural one of the same colour, near the tip. This is connected with the anterior one by a narrow yellow line. *Z. puberula*, Cr., differs from *variens* in having the thorax entirely yellow, the elytral yellowish area ill-defined. The punctures are close together, the outer joints of the antennæ black. A specimen has been sent from Toronto by Mr. Crew.



FIG. 6.

SYNETA, Esch.

Represented by *S. ferruginea*, Germ. (.30-.32 in.), a yellowish or reddish-yellow beetle of rather coarse sculpture. The thorax is angulate, with three more or less well-marked teeth on each side. The elytra are marked with four costæ of various degrees of distinctness. It is often beaten from hazel thickets.

TRIBE III.—CRIOCERINI.

A few Canadian beetles of neat form and usually striking coloration belong here. The thorax is much narrower than the elytra, which are punctate in rows. The two genera differentiate easily, thus, so far as the species under consideration are concerned:—

- Prothorax with a constriction about the middle, elytra striped.. *Lema*.
 Prothorax cylindrical, elytra spotted..... *Crioceris*.

LEMA, Fabr.

L. trilineata, Oliv. (Fig. 7), is the only Canadian species. It is of a reddish colour, with two thoracic spots, the antennæ (excepting the first joint), tips of tibiæ and tarsi, blackish. The elytra are of a clear light yellow, or nearly white, with a common sutural black stripe, and each with a narrow submarginal vitta of the same colour. Length about .25 in. (Fig. 8: *a a* represent the larva with its singular covering of excrement, *b* the last joints of the abdomen, *c* pupa, *d* the eggs.)



FIG. 7.



FIG. 8.

CRIOCERIS, Geoff.

Two imported European species are known from the adjacent regions, though but one of these seems to have been actually reported from Canada. They prey upon asparagus, and, from the striking pattern of coloration are easily known.

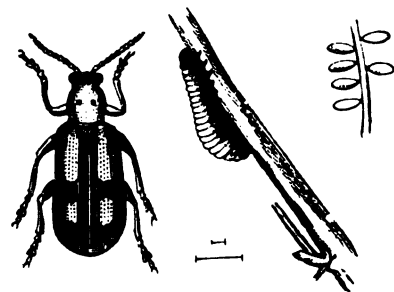


FIG. 9.

C. asparagi, Linn., is from .16 to .24 in. long, of a greenish or bluish-black colour, the thorax red with two black spots of variable size usually present. The elytra are reddish-yellow, with a blue-black cross formed by the crossing of a longitudinal sutural stripe and transverse median band, and with an apical and basal spot of the same dark colour on each; or they may be blue-black with the outer and apical margin and three spots on each yellow. (Fig. 9 represents the eggs, larva and beetle much magnified.) *C. 12-punctata*, Linn., is .19-.24 in. long, dull red, each elytron with six black spots of variable size. The antennæ, knees, and tarsi are also black.

I desire to acknowledge the kindness of Mr. W. S. Cody, B. A., of Windsor, Ont., in contributing a Canadian specimen of *Argynnis Idalia* to the Society's collection. I am indebted to Mr. Wm. Lochhead, of Napanee, Ont., for the information that this handsome butterfly has been added to the Canadian List. J. ALSTON MOFFAT, Curator.

CANADIAN HYMENOPTERA. NO. 7.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The object of this paper is chiefly to record some observations, made last summer, on a few parasitic forms, but mention is first made of two phytophagous species.

STRONGYLOGASTER? *MARGINATA*, Prov.

Selandria marginata, Prov., Add. Faun. Hym., 1885, p. 8.

Eriocampa marginata, Prov., Cresson, Cat. N. Am. Hym., 1887, p. 162.

Strongylogaster primitivus, MacG., CAN. ENT., 1893, Vol. XXV., p. 241.

Tenthredopsis primitivus, MacG., CAN. ENT., 1894, Vol. XXVI., p. 327.

Mr. MacGillivray has recently kindly sent to me one of his types of *primitivus* for comparison with that of Provancher's *marginata*, and I find, as was already evident from the description, that it is the same species. The generic position of the species is, however, not so readily determined; Mr. MacGillivray being now of opinion that it belongs neither to *Tenthredopsis*, *Strongylogaster* or *Taxonus*, but probably to some yet undescribed genus. It certainly does not belong to *Tenthredopsis* as adopted by Cameron in his monograph of the British Phytophaga, nor to *Selandria*, so that I have left it for the present in *Strongylogaster*, to some of our accepted species of which it is very similar in appearance. Several of the groups of our *Tenthredinidæ* require revision, the classification of species solely from wing venation being unsatisfactory, for in the phytophagous hymenoptera the venation is much more unstable than in the other divisions of the order. I fear, for instance, that Mr. MacGillivray's genus *Bivena* (CAN. ENT., Vol. XXVI., p. 327) has been founded upon the accidental occurrence of a supplementary marginal cell.

CEPHUS PYGMÆUS, Linn.

The continued spread of this wheat-stem sawfly is evidenced by the occurrence of two males in a small collection made on 5th July, at Indian Head, Assa., by Mr. Fletcher, during his trip to British Columbia last summer.

PEZOMACHUS PETTITII, Cresson, CAN. ENT., 1892, Vol. IV., p. 61. ♀.

Pezomachus sulcatus, Prov., Add. Faun. Hym., 1885, p. 77. ♀.

Stibeutes Pettitii, Cr., Riley and How., Ins. Life, 1890, Vol. III., p. 154.

This is the commonest species of our wingless Cryptids, but I have noted only one mention of its having been bred, which is in the list published in *Insect Life* (*loc. cit.*) of bred parasitic hymenoptera in the United States National Museum, the record being as follows:— "*Bucculatrix* found on stone, Virginia, April 9th." The species is there referred to the genus *Stibeutes*, which in Cresson's synopsis is said to have the "Metathorax completely and regularly areolated," while in *Pezomachus* it is "not, or irregularly areolated." None of my specimens show any areolation, the indications of any metathoracic carinæ being of the feeblest nature. This insect has frequently been taken with the sweeping-net on foliage from June to September, and on one occasion in the latter month, as I was reclining under a pine tree, near Aylmer, I observed numerous examples running about on the carpet of dead pine leaves which covered the ground. They had a remarkable resemblance to some of the ants which are always roaming around in such places. Last April I obtained, under a large flake of loose bark on an elm stump, a number of egg-cocoons of an undetermined spider. They were hemispherical in shape, and made of a very white silk, and were covered by irregular tent-like masses of the same flocculent, viscid silk, spun between the bark and the surface of the wood. On opening one of the egg-masses I found two hymenopterous larvæ among the yellow eggs, and therefore secured a number of the cocoons, which, when removed, adhered to one another and formed a sticky mass in the small box in which I had to place them. Two of the parasites emerged on May 19th, and proved to be males of a *Hemiteles* not in my collection. Two days later a similar winged male appeared, and also three wingless males, which I saw belonged to *Pezomachus Pettitii*. Four wingless males, one winged male, and one female emerged the following day, and others followed until, in all, I obtained four females, seven wingless males, and six winged males. There can be no doubt that the winged forms, though differing in the shape of the thorax from those without wings, are specifically the same. This rearing confirms the opinion held by many authors [For example see Walsh, *CAN. ENT.*, Vol. II., p. 10.], of the identity of the genera *Hemiteles* and *Pezomachus*, and I have special pleasure in recording it at the present time, in view of the following recent reference to the subject by Dr. Sharp (*Can. Nat. Hist.*, Vol. V., p. 556): "The little Ichneumons of the genus *Pezomachus* are quite destitute of wings, and somewhat resemble ants; they are quite common

insects in Britain. Only the female sex is known, and it is believed that the winged Ichneumons assigned to the genus Hemiteles, of which no females are known, are the males of *Pezomachus*. Repeated efforts have been made to place this beyond doubt, but they have usually failed, for when a brood of these parasites is reared the individuals generally prove to be either all Hemiteles or all *Pezomachus*. It is to be hoped that this interesting case will be fully elucidated." Of the American species assigned to *Pezomachus*, several are known in both sexes. Mr. Howard, for example, describes both ♀ and ♂ of *P. micaria* (Proc. Ent. Soc., Wash., Vol. II., p. 194), bred by Mr. Emerton from the egg-cocoons of a species of *Micaria*. Individuals of *P. Pettitii* vary somewhat in colour and in shape of thorax, the anterior node of which is often sulcate, as in Provancher's type of *sulcatus*. Nearly all those taken in the field have the abdomen entirely dark, except the apex of first segment, while all the bred specimens have the apex of second segment also pale. The winged males appear slightly larger than the wingless, and have the abdomen slightly more elongate, but its markings are exactly the same. The fully developed thorax is black, and the wings have a large triangular stigma of a dark brown colour. The antennæ are darker, and apparently more slender.

PEZOMACHUS OTTAWAENSIS, n. sp.

Female, length, 5-6 mm. Rufous, with abdomen in part black. Head transverse, slightly narrowed behind; occiput concave; antennæ long and rather slender, 23-jointed; face subtuberculate, as also clypeus slightly; mandibles sometimes paler, with the teeth black. Thorax binodose, the nodes subequal; the rounded metathorax not areolated, but with the posterior face flattened obliquely. Abdomen with a broad rufous-orange band covering nearly all the second segment, the petiole also rufous; the second segment narrowly black at base, and the following segments black, polished; ovipositor exerted about 1 mm., sheaths black at tip.

Described from 23 females bred, with two exceptions, from egg-cocoons of spiders. This is a large, handsome *Pezomachus*, very constant in coloration, especially of the abdomen. The base of petiole, posterior coxæ, and femora are darker in a few specimens, and the vertex of head is occasionally clouded; individuals may possibly occur with the head in part black. The egg-cocoons in which this species breeds are

flattened, scale-like objects, 10-12 mm. in diameter, adhering closely to stones, and often irregular in shape to conform to the uneven surface. When new, the silk of which they are spun is of a delicate drab shade, but weathered cocoons found in spring are of a dull, dirty gray. A single larva of the *Pezomachus* occupies each infested cocoon, and when it has devoured all the spider's eggs it spins its own elongate cocoon within that of its host. This insect must be a great check upon the increase of its spider-host, for of scores of cocoons examined in one locality last spring hardly ten per cent. had escaped infestation. Through the kindness of Mr. L. O. Howard, one of these cocoons has been examined by Mr. Nathan Banks, who pronounces it to be "almost certainly a Drassid cocoon, possibly *Micaria*, but more probably *Prosthema*." The cocoons are sometimes found on the under surfaces of stones and pieces of wood, but more frequently on the upper surface of large embedded rocks.

HEMITELES OTTAWAENSIS, n. sp.

Male, length, 5 mm. Black, with segments two and three of abdomen yellowish. Head black; palpi pale; antennæ blackish, slender, about 25-jointed, scape, pedicel and base of third joint pale. Thorax black, finely punctulate or shagreened; tegulæ pale; legs rufo-testaceous, including coxæ; the posterior tibiæ and tarsi brownish; wings as usual, stigma brown; metathorax feebly areolate, the lateral and posterior transverse carinæ more distinct. Abdomen narrow, segments two and three yellowish, remainder black.

Described from one male reared from egg-cocoon of spider. The cocoon was one of a lot, gathered at same time and locality, which yielded several individuals of the previously described species, and the *Hemiteles* is probably the male of that species. I have, therefore, given to it the same specific name. As it differs, however, in the evident, though imperfect, areolation of thorax, and in colour of abdomen, etc., it may be better to separate it for the present. The abdomen is narrower and less robust than that of the winged males of *P. Pettitii*.

MASTOCHARIS WILDERI, Howard.

Twenty-two examples of this little Chalcid were bred from a hemispherical egg-cocoon of a spider, attached to the under surface of a hickory leaf. They issued, however, from the cocoon of an Ichneumonid, prob-

ably a species of *Pimpla*, which had devoured the spider's eggs. The greenish-blue reflections of the head and thorax of the females, and the bright coppery gleam of the smaller males, make these little creatures, when alive and hurrying to and fro with trembling antennæ, objects of considerable beauty. Mr. Howard records the species (*Proc. Ent. Soc., Wash., Vol. II., p. 299*) from James Island, S. C.; Brooklyn, N. Y.; Sea Cliff, L. I.; Washington, D. C.; and Los Angeles, Cal., showing a very wide distribution.

TELENOMUS, n. sp. ?

From two eggs found attached, and side by side, on the upper surface of a hickory leaf, I obtained thirty-one individuals (25 ♀, 6 ♂) of a *Telenomus*, which appears to be undescribed, but as the genus is such an extensive and difficult one I do not care to name it. The eggs, which are those of our beautiful pale green, swallow-tailed Luna moth, are round and flattened; white above and below, and surrounded by a dark brown band. They are about 2 mm. in diameter, and not much more than 1 mm. in thickness, so that when one was tenanted by at least sixteen larvae, their quarters could not have been over spacious. It requires somewhat careful examination of the egg to find the minute hole from which the parasites issued.

ACOLOIDES SAITIDIS, Howard.

From the same batch of spider-cocoons which produced the seventeen examples of *Pezomachus Pettitii*, there came forth, a few days later, a host of minute Prototrypids, which seem to belong to the species named as above by Mr. Howard (*Ins. Life, Vol. II., p. 270*), and constituted the type of his new genus; the type specimens having been bred from eggs of the spider *Saitis pulex*. My specimens differ from the description only in having the apex of the first abdominal segment yellowish. They commenced to appear on June 4th, and by the evening of June 6th there had issued 160, nearly all of which were females. The total number that came forth was 206, consisting of 162 ♀ and 44 ♂. Such figures might indicate this to be a very common insect, yet I had never met with it in my collecting. Previous records for the species are Lincoln, Neb., and Oxford, Ind.

CHRYSID NITIDULA, Fabr.

One example of this beautiful green Chrysid was bred from an almost black cocoon, which was found in a cell of *Odynerus catskillensis*,

Sauss. The Odynerus cells were built of clay, upon the under surface of a stone, and formed a compact mass which could not be removed without rupturing the cells, as their silken lining adhered directly to the uneven surface of the stone.

CHRYSID PARVULA, Fabr.

This pretty species very closely resembles the preceding, but is easily separated by the shape of the terminal segment of abdomen, which is truncate and tridentate (the central tooth strongest), instead of quadridentate, with curved emarginations separating the teeth. Two examples were bred from cocoons taken from the cells of *Pelopæus cementarius*, Drury, the slender-bodied wasp whose large clay-built groups of cells are so frequently seen under window-sills and other ledges in the city, and are placed under stones in the fields. The cocoon of the parasite occupies one end of the cell made by the industrious wasp as a home for its own young, and is almost identical in shape and colour with that of the other Chrysid. The insects emerged on June 2nd and 4th, the cells having been obtained some weeks previously. Mr. Ashmead has recorded (*Psyche*, Vol. VII., p. 79) the rearing of *C. perpulchra*, Cr., and *C. cærulans*, Fabr., from the same host.

CEROPALES FRATERNA, Smith.

While searching, one day in early spring, for the potato-like galls which are produced by *Tribalia* upon the roots of wild roses, I found under a flat stone, slightly imbedded in the turf, about a dozen fusiform hymenopterous cocoons, about 15 mm. long. They were scattered on the surface of the soil, and some had already become mouldy from the dampness of the ground. From those which were not so affected I obtained in due time a female and four males of *Pompilus luctuosus*, Cr., which liberated themselves by neatly cutting off the large end of the cocoon. From one of the larger cocoons there emerged in the same manner, instead of the velvety-black *Pompilus*, a long-legged, yellow-banded *Ceropales*.

AGENIA ARCHITECTA, Say.

The mud cells of this pretty little blue wasp are not uncommon under stones in dry fields near woods. They are cylindrical in shape, and several may be found on the same stone, but they are not massed together and cemented into one lump, as are those of the mud-wasps previously mentioned. The wasps have been bred several times, but I have as yet reared no parasites.

ON THE STRUCTURAL AFFINITIES OF THE GENUS DEMAS.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.

In the Journal of the New York Entomological Society, Vol. III., pp. 130-131, Mr. Harrison G. Dyar writes as follows: "Prof. E. B. Poulton has shown that dorsal eversible glands are of general occurrence throughout the *Lymantriidae* (Trans. Ent. Soc., Lond., 1887, p. 300) on the tenth and eleventh joints (segments), or rarely only on the eleventh joint (*Dasychira pudibunda*). Probably these structures are characteristic of the family, but Prof. Poulton did not find them in *Demas*. This genus has been considered to belong to the *Noctuidae*, but English authors assume it to be a *Lymantriid*. Mr. J. W. Tutt remarks, in speaking of Prof. J. B. Smith's recent 'Catalogue of the Noctuidae' (Ent. Record, VI., p. 70):—"The obsolete position of *Demas* among the *Noctuidae* is retained." Now, is this position 'obsolete?' The absence of the retractile tubercles certainly throws doubt on the matter. Now, I have shown a characteristic difference in the arrangement of the thoracic tubercles between the *Lymantriidae* and the *Noctuidae* (Trans. New York Acad. Sci., XIV., p. 57), and *Demas* shows the Noctuid structure. Therefore, on all essential larval characters *Demas* is a Noctuid. It might, indeed, be an Arctian, as far as the larva goes, but not a *Lymantriid*. As concerning the structure of the imago, *Demas* seems to have greater affinity with the *Noctuidae* than any other family; in fact, it appears to me that the placing of *Demas* among the *Lymantriidae* may properly be characterized as premature." Further, Mr. Dyar writes as follows:—"Pupa, shining dark brown with a large wrinkled cremaster and three movable incisures. Of the usual Noctuid appearance (quite unlike *Orgyia*) and passing the winter." This statement regarding the pupa must be read carefully in connection with the remarks of Dr. Chapman quoted below.

Now, I would call Mr. Dyar's attention to the following statements made by Dr. Chapman some two or three years ago. He writes:—"We now come to the two species, *Demas coryli* and *Diloba caeruleocephala*, that are certainly not very much related to each other, and though they have some indications of affinity with *Acronycta*, are not near enough to be placed in the same family. *D. coryli*, I should certainly restore to its old place in the *Liparidae*, to which it is far closer than to the *Acronyctas*. . . . But neither of them seemed to me to be nearer to *Acronycta*

than is *Arctia* or *Liparis*, or *Orthosia*, or *Xylina*, which appear to be perhaps the families nearest to *Acronycta* in different directions" (Entom. Record, Vol. III., p. 249).

Dr. Chapman then gives (Ibid. pp. 249-251) a most exact and scientific description of the egg, the newly-hatched larva, and the larva after each change of skin, of *D. coryli*, annotating his description throughout by comparison with the *Liparidæ* (or *Lymantriidæ*, as it appears to be called by American lepidopterists).

After thus exhaustively dealing with the structure of *Demas* in its various stages, Dr. Chapman concludes:—"The larva of *D. coryli* is clearly a Liparid, not, therefore, perhaps so very remote from *Acronycta*, but, still, distinctly a BOMBYX (if that name still has a definite collective meaning) and not a NOCTUA. The pupa of *D. coryli* is not that of a NOCTUA, though the character of the anal armature has some resemblance to various NOCTUA forms" (Entom. Record, Vol. IV., p. 97). The larva is excellently drawn and figured in the same volume of the magazine (Pl. IX., Fig. 2), where the newly-hatched larva is shown $\times 20$ diams., and compared with the Acronyctids, with which it has been suggested to have certain affinities. The pupa is also figured in the same plate (Fig. 5, pupa of *D. coryli*, nat. size; Fig. 5a, pupa of *D. coryli*, showing dorsal view of armature; Fig. 5b, pupa, showing ventral view; Fig. 5c, pupa, showing lateral view;—the three latter $\times 15$ diams.

It is clear that neither Prof. Smith nor Mr. Dyar have ever seen these excellent papers by Dr. Chapman. It is equally clear that it should be the business of every lepidopterist of repute to do so. One of the greatest complaints that I have to offer against critical writers on American lepidopterology is their general ignorance of British work. Surely the *Transactions* of our leading Entomological Societies and the leading magazines should be a part of every entomologist's monthly or quarterly pabulum. If they were, one would have to complain less of misunderstanding due to a want of knowledge of all the facts bearing on the case.

I trust if Mr. Dyar or Prof. Smith should be inclined to challenge the above facts, they will read Dr. Chapman's articles first. The above are necessarily brief excerpts, and the whole bearing of Dr. Chapman's position can only be understood by reading his complete essays.

A NEW COCCID FROM TEXAS.

BY T. D. A. COCKERELL, NEW MEXICO AGR. EXP. STATION.

Aulacaspis texensis, n. sp.—♀ scale circular, $1\frac{2}{3}$ mm. diameter, very slightly convex, dull brownish-gray or sepia-brown, becoming transparent at the edges; sometimes entirely whitish. Exuviae exposed, sepia-brown, not far from central, 1st skin to one side of 2nd, but wholly on it, with some white secretion extending over the centre of the 2nd.

♀ alive, plump, dull pale greenish-orange. When dead and dry dark yellowish-brown, remaining so when boiled in soda. Outline circular, pygidial portion striated; anal orifice rather small, as far behind level of caudolateral groups of glands as they are behind cephalolateral. A marginal row of 3 or 4 longitudinally elongated pores; and a sub-marginal row of pores, the two caudad longitudinally elongate, the 3 cephalad small and round; 5 groups of ventral glands, caudolaterals 10, cephalolaterals about 16, median about 8. Median lobes wide apart, with a slight prominence between them bearing a pair of small spines. Median lobes oblique, much as in *A. bromeliae*, but the long inner slope convex, with 5 very distinct serrations, counting the one which forms the tip; outer short margin with one serration. Immediately outside each median lobe, and touching it, is a spine-like plate, its tip about or hardly on a level with the tip of the lobe. Then comes a very small and low, strongly bifid 2nd lobe, then a spine, then a rather large spine-like plate, then a very low and broad trifid lobe (one might almost as well say 3 serrations on the margin), then a spine, then a spine-like plate, then two serrations, and a very rudimentary third (sometimes all three obscure), then another spine-like plate, and after a short interval another, then after a short interval a pointed prominence followed by a notch, then 3 spine-like plates at rather long intervals.

♂ scale 1 mm. long, white, tricarinate, but the lateral carinae rather feeble; exuviae very pale ochreous. The ♂ scales occur in patches on the leaves, much as in *Chionaspis exercitata*, Green.

Hab.—San Antonio, Texas, Nov. 27th, 1895, on both sides of leaves of *Sophora secundiflora*. [C. H. T. Townsend.]

The species was first collected by Mr. Schwarz; and afterwards Messrs. Howard, Schwarz, and Townsend found it very abundant near San Antonio. The plant was determined by Mr. Coville. This is the first native North American *Aulacaspis*.

PHOTOGRAPHS WITHOUT SHADOWS.

A large percentage of the half-tone reproductions from photographs, for illustrating Experiment Station Bulletins, are greatly reduced in value because of a lack of detail caused by heavy shadows, resulting from the use of opaque backgrounds near the objects photographed. To overcome

this difficulty and to make such pictures of more value to specialists working in the fields of entomology, botany, and horticulture, a device, which is the outcome of combining several well-known principles, is here represented.

Many details can be easily photographed and reproduced by this arrangement which are usually obtained by pen and ink drawings, and the personal equation entering into such work is thus eliminated.

The salient features of this device are: no shadows, accuracy of colour values and form; details and time are saved. All these features are evident from a glance at figure 11, except, perhaps, the saving of time; but after a second thought, this is also obvious, as the objects to be photographed are simply laid on a horizontal plane instead of being fastened to a perpendicular surface.

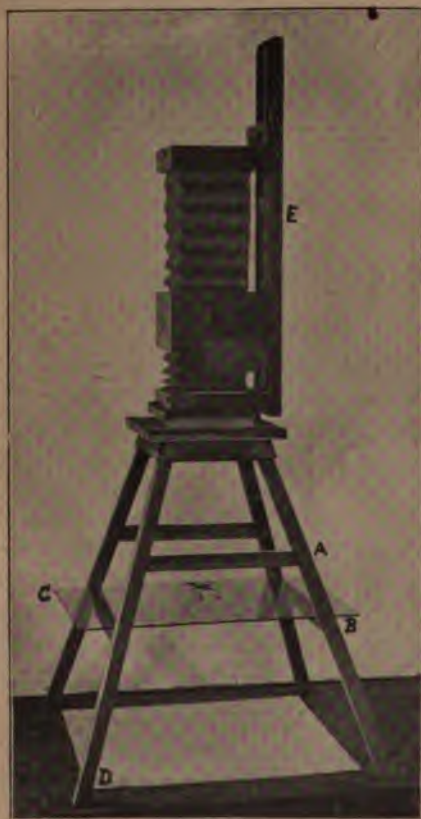


FIG. 10.

Dr. Holland, of Pittsburgh, Pa., a Lepidoptera specialist, on a recent visit to our Station, saw the arrangement and was much pleased by the advantages it offers to any of his plans for obliterating shadows in photographing butterflies and moths.

Pictures being more easily understood than descriptions, we have made a photograph of the outfit shown in figure 10, and also one showing a butterfly taken with the device, figure 11.

The apparatus consists of a four-legged stool, in this case $2\frac{1}{2}$ feet high, with an opening in the top and a copying camera placed over the hole. A pane of glass (C) is now placed on the upper or lower rounds of the stool (A or B), according to the distance you wish your object to be from the lens. The objects to be photographed are placed upon the glass, and for a background a sheet of paper or other material is laid on the floor (D) under the glass. In this case a white background is used because the butterfly is principally of a dark colour. By a glance at figure 11 you will see that the objectionable shadows are obliterated.

In photographing pinned insects it is necessary to have some scheme for holding them on the glass in the position desired. This is easily done by gluing a small piece of cork on the glass surface in which to insert the pin holding the insect. It is necessary to have the cork small enough so that it does not protrude beyond the specimen when looked at through the camera.

This device can be easily modified to suit an ordinary view camera by simply adding a piece of board to the top of the stool and letting it extend in a perpendicular manner similar to E in figure 10. By having a hole in this board one can fasten a camera in place with a thumb-screw, precisely as it is fastened to a tripod, with the exception that the lens is directed downward.



FIG. 11.

W. EARL RUMSEY,
Asst. Entomologist.

West Virginia Agr. Expt. Station, Morgantown, West Va.

A NEW TYPHLOPSYLLA FROM MEXICO.

BY CARL F. BAKER, FORT COLLINS, COL.

Belonging to that group of the genus having head combs arising in front of the antennal grooves in a line nearly perpendicular to the long axis of the head, instead of along the lower margins of the cheeks, and which includes the two species *gracilis* and *fraterna*.

Typhlopsylla mexicana, n. sp.—Female. In form resembling *T. musculi*. Head rather strongly pointed, face receding. Bristles on head numerous, strong and spine-like, one on either side of extreme tip, short

and stout. Antennal groove open, spines on second joint equalling tip of joint 3. Head comb of four short, heavy spines, their tips very obtuse and sides nearly parallel; the second from above reaching as far back as tips of antennæ, and slightly longer than the others, which are nearly equal in length. Maxillæ very acute, rather broad at base. Maxillary palpi stout, the joints decrease in size in the following order: 1, 4, 2, 3, the third being shortest, the fourth narrowed to a slender tip. Mandibles reaching two-thirds length of anterior coxæ. Pronotal comb of twenty-two close-set spines. Bristles on dorsal abdominal segments in two rows, the second of ten to fourteen long and strong bristles, on ventral segments in single rows of four to eight similar bristles, the tuft on apical ventral segment rather large. Legs rather strongly spined, close-set even rows of spines on posterior margins of all tibiæ being especially conspicuous. Apical spines on hind tibiæ extending nearly two-thirds the length of first tarsal joint. In middle tarsi joint 2 equals 5, 3 is half of 1 and three-fourths of 5, 5 is twice 4. In hind tarsi joint 1 is as long as 2, 3, and one-half of 4 together, and about three times the length of 3, 2 equals 4 and 5 together, 3 nearly equals 5. Colour pale brownish. Length 2.5 mm.

Described from a single female taken from "*Mus rattus*" at Guanajuato, Mexico, by Dr. Alf. Duges. This very distinct species is easily separated from either *gracilis* or *fraterna* by the above description.

BOOK NOTICE.

Mittheilungen aus dem Roemer-Museum, Hildesheim. No. 3.—Januar, 1896. DIE APATELIDEN, von A. Radcliffe Grote, A. M. (Mit 2 photographischen Tafeln und 3 Zinkographien im Texte.)

Mr. Grote here defines the family Apatelidæ and gives a list of the species which can be referred to it with reasonable certainty in the present state of our knowledge. The subdivision of the genus *Apatela* on larval and on pupal characters is discussed at some length, and 15 subgeneric names are recognized, including both European and American species. Two of these names are new, and one new species is described, *Panthea portlandia*, Grote. The two plates represent a number of typical European Apatelidæ. The moths are excellently done, but the larvæ are only imperfectly shown, as their cylindrical bodies fail to focus sharply in the photographs.

This paper may also be consulted for a concise statement of the classification of the Lepidoptera on larval characters (page 3), and a continuation of the discussion of the generic term *Noctua* (p. 4).

HARRISON G. DYAR.

Mailed March 3rd, 1896.

The Canadian Entomologist.

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No. 4.

A CONTRIBUTION TO THE KNOWLEDGE OF NORTH AMERICAN SYRPHIDÆ.

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[The material mentioned in this paper (with the exception of the type of *Chilosia Townsendi*, n. sp., from the collection of the Cal. Acad. of Sciences) is in either the collection of the University of Nebraska or of Prof. C. W. Johnson, of Philadelphia. In each case I have taken care to mention in which one of these the specimens may be found.]

Callicera Johnsoni, n. sp.

Male.—Eyes contiguous for about two thirds their width above, densely long, white pilose, with a sharply defined vertical black band about one-fifth their width; above, the two bands are confluent. Occiput shining olivaceous, white pilose. Ocellar area with a tuft of ferrugineous pile. Spot above the antennæ bare, shining black. Face shining black, except the tip of the indistinct tubercle, which is opaque; covered, except an indistinct median stripe, and more densely below, with abundant long light yellowish pile; very indistinctly concave below the antennæ. Cheeks shining olivaceous, except an anterior velvety cross-band and an indistinct spot below the lowest margin of the eyes; long yellow pilose. Palpi clavate, testaceous at base, apical half black. Antennæ entirely black, with short stiff black hairs on the first and second joints; first joint cylindrical; second expanded at apex, less than half as long as the first; third joint bare, over twice as long as the first and second together, expanded on basal half, flattened, bent outwardly at middle. Style short, obtuse. Thorax: dorsum shining olivaceous, with five opaque, very indistinct, longitudinal bands; pile obscure yellowish, abundant. Pleura shining, with more distinctly yellow pile. Wings a trifle tinged with yellow anteriorly, veins testaceous. Anterior cross-vein distinctly before the middle of the discal cell. Last section of the fourth vein with the first third straight, distinctly sinuate inwardly. Tegulæ white, ciliate. Abdomen entirely covered with moderately long yellowish-white pile; first segment entirely opaque; second, except a broad cross-band, expanded medially into a large triangle, the apex of which reaches

the anterior margin, shining olivaceous; third segment entirely shining. Legs: femora, except the extreme tips, black; long white pilose; tibiæ testaceous at base, at apex ferrugineous. Tarsi ferrugineous, darker at tips. L., $10\frac{1}{2}$ mm.

One specimen [Fairmont Park, Philadelphia, Pa.], collected by Mr. Chas. I. Greene and kindly transmitted to me by Prof. C. W. Johnson, of the Wagner Institute of that city, to whom I most respectfully dedicate it.

This species differs from the European *C. ænia*, Fabr., to which it is allied, in the markings of the abdomen, the absence of the "snow-white style," the general dull colour, and in several other respects; from the only other described North American species, *C. montensis*, Snow, in not having the face and front black pilose nor the thorax and abdomen golden pilose. Mr. Snow writes me that he has never observed any variation in the colour of the pile in *montensis* at all. There are other differences in the coloration of the antennæ and legs and in the form of the fourth vein.

The capture of this insect is deemed worthy of more than passing notice. The species of *Callicera* are found almost exclusively near the tops of mountains. The only species up to the present time found outside of Europe was *C. montensis*, Snow. The three type specimens were taken on the top of Mt. Deception, in Colorado, at an altitude of 9,000 feet. Later, two more specimens were taken on one of the peaks of the Magdalena Mountains, in New Mexico, at an altitude of 9,500 feet, also by Snow. The species was described by Snow, in Kansas Uni. Quart. Vol. I., p. 33; July, 1892.

In Europe, as far as I have been able to ascertain, there is only one record of the capture of a *Callicera* except on a mountain top. Prof. Stein has this note in the Berlin Ent. Zeitschr., 1860, 325 [translating]: "*Callicera fulva*, Schaum.—I captured a female of this species on the first of June, in the vicinity of Frankfurt-a.-d.-O. It was resting on flowering *Spartium scoparium*, which was, perhaps, only accidental. A thorough search of the same place eight days later yielded no result."

The present is, therefore, the second record of the capture of a species of this genus at a remarkably low altitude, the altitude in this case being considerably lower than that of Frankfort-on-the-Oder, which is about 125 feet. Fairmont Park lies on both sides of the Schuylkill River, adjoining Philadelphia on the Northwest, and probably in no place exceeds an altitude of sixty feet.

The occurrence of the first discovered specimen of this European genus in the western part of North America was another verification of the well-known biological law that European forms are more likely to occur in the western than in the eastern part of this Continent, as pointed out by Snow. It is clear now, however, that since two species have been discovered, one eastern and the other western, and the eastern as closely related to the typical European forms as the western, that any such conclusion in regard to this genus is no longer valid.

Microdon fulgens, Wied.

This species was included in Williston's Synopsis of N. A. Syrphidæ, on the authority of Wiedemann, who described the species, *Aussereuropæischen Zweifl.*, Insecten 82 (I.), from a specimen "In Berliner Museum, aus Neugeorgian," and on Macquart's statement, *Dipt. Exot. Ier. Suppl.*, 122, of habitat as Florida and Guiana. Wiedemann's short, terse description is abundantly sufficient to separate it from its congeners. It is as follows:—

"Antennæ black. Face steel-blue, thinly yellowish-white pilose. Thorax golden-green; in certain reflections there appear copper-coloured stripes. Ante-alar callosities (*Vorflügeldreieck*) steel-blue; front between green and blue-metallic. Wings nearly pure brown, on the thin veins only brownish; tegulæ white with a black ciliate border. Legs green or blue" [translation by Williston].

The front is mixed white and black pilose, front and middle tarsi opaque black, pulvilli light yellow. Scutellum very broad, the posterior margin almost parallel with the anterior; the spines distinct. The outer cross-veins are distinctly sinuate.

One specimen, a female [St. Augustine, Florida; Prof. C. W. Johnson], now in the collection of the University.

The robust form, entirely metallic colour, black antennæ, and large size are such as to make the species unmistakable.

Chrysotoxum derivatum, Walker.

This genus is a very difficult one, and much confusion prevails even in Europe as to the limitation of the species. Even such structural characters as the comparative length of the antennal joints are of very little value, although such an authority as Schiner has used them. They all show a very great resemblance in coloration, and the species are very variable. In Europe there are about fifteen described species, and in this country ten, one of which must be dropped on account of the imperfect description.

The material in the University collection contains numerous specimens that must be *C. derivatum*, but it is only by a process of elimination that this conclusion can be reached. As Mr. Snow states of other specimens: "They seem to belong here, however, better than elsewhere." These specimens were taken in extreme North-western Nebraska, and in the Big Horn Mountains, in Wyoming. They exhibit all the variations in the markings of the abdomen that Snow has mentioned (Kans. Uni. Quart. Vol. I., 35). Besides these, there are three specimens of both sexes—two taken at Lincoln and one at Harvard, Nebraska—that differ as follows: The anterior margin of the wings is only very lightly tinged with yellow, whereas in the others they are always very distinctly so; the abdomen is covered with erect, light-coloured pile, while in the mountain specimens it is provided with only very short black hairs; the median stripes of the thorax are very distinct, while in the others they are obsolete or entirely wanting; the four anterior femora are entirely yellow, while in the others there is a distinct black spot near the base. From this I conclude that these specimens are of a different species, which I am quite certain is *pubescens*, Loew, although the only differences in the descriptions of these two species are that in one there are distinct dorsal vittæ and the wings are tinged with brown anteriorly, while in the other these points are not mentioned, and hence, may or may not be present. But from a study of this material, part of which must be *derivatum*, I am certain that *pubescens* and *derivatum* are both good species, and should stand, no matter how many of the other species of this genus must fall. I am thus enabled to give the following amended descriptions of the two species.

C. derivatum, Walker.

Second joint of antennæ one-fourth to one-half as long as third, sometimes shorter than the first; arista yellowish. Thorax with the median vittæ at all discernable only in the female. Abdomen everywhere covered with short sparse black hairs. First segment black, second lateral margin black, except sometimes the posterior corners, the yellow band is very distinctly interrupted, the two parts arcuate and often expanded medially, posterior margin black. Band of third segment more equal in width than first, interrupted or entire, not always reaching the lateral borders, which are mostly black; entire posterior margin expanded in the middle, yellow. The black markings of the fourth segment vary from an anterior uninterrupted band, expanded to include most of the

lateral borders, and a complete arched band in the middle of the segment to a very narrow anterior band, sometimes interrupted in the middle, and not including all of the lateral margins, and an indistinct middle spot with a very slender, elongate spot at each side of it. On this segment the yellow posterior margin may be entirely separated from the anterior band, but usually they are confluent at the corners. Fifth segment with an anterior black band, expanded to include more or less of the lateral margins, and a black spot like an inverted V or Y. Often this spot is obsolete, leaving only three small spots to form the outline of a V. Legs yellow. All the coxæ, and trochanters, and a distinct shining spot at the base of each of the four anterior femora, black. Posterior tarsi tinged with reddish. Wings very distinctly brownish (less so in the female) on anterior third.

C. pubescens, Loew.

Very much like *derivatum*, but differing in having the legs entirely yellow, the abdomen everywhere covered with erect yellowish pile, and the median thoracic stripes distinct. The wings are much less distinctly marked with yellow. Second joint of antennæ longer than first; third joint in female about equal to the first two; in the male it is slightly longer. Abdomen marked like that of *derivatum*, except that the posterior margin of the second is always yellow, and the anterior corners of segments three and four are reddish. The black mark on the fifth segment is like an inverted V or Y; or the branches may be arcuate.

Psilota buccata, Macquart [Dipt. Exot. II., 2, 107, pl. xviii, fig. 2].

The history of this species and its attribution to the United States is as follows: It was described by Macquart, in the Memoirs of the Society of Arts and Sciences of Lille in 1841, and the locality given as "Carolina." It was here placed in the genus *Pipiza*. In the fifth supplement to the Dipt. Exot., which was published in 1855, Macquart describes a species, *flavidipennis*, for the first time under the genus *Psilota*, which was founded by Meigen, in his Syst. Besch. III, 256, in 1822, several years before the other species, *buccata*, was described under the genus *Pipiza*.

In 1862 Dr. Loew, in the Monographs of the Dipt. of N. A., I, 27, in mentioning the various genera of *Syrphidæ* that have been recorded from North America, states that Macquart has recorded a *Psilota* from North America, but that, as that genus had been misunderstood by most authors, he would not venture to mention it among those truly represented in N. A. The reference mentioned above was undoubtedly his authority for this statement.

The next step comes in 1878, with the appearance of Osten Sacken's second edition of his Catalogue of N. A. Diptera. In that he includes *Psilota flavidipennis*, Macq., giving the author's habitat, Philadelphia, and calling attention to the note by Loew just referred to. It is very certain that if he had found the species in nature, he would have mentioned the fact. We must hence conclude that he had not, and included it simply on the authority of Macquart, which makes it very uncertain that the species is North American at all up to this date.

Between this time and the time of the publication of Williston's Synopsis it is evident that some specimens were captured in this country. For Williston states that he found two specimens in the Loew type collection which were labelled *Psilota flavidipennis* at Cambridge. Hence, it is certain from this time on that this species is a North American one, and that Macquart's locality was probably correct, as was his determination.

Now, Williston states that he has no doubt that these specimens so labelled are *buccata*, but that they are *flavidipennis* is doubtful. In other words, he thinks that the correct determination of the specimens is as *buccata*, and that Macquart's other species, *flavidipennis*, may or may not be the same as that species. Hence, in his Synopsis he places Macquart's description of *flavidipennis* along with that of *buccata*, as revised after an examination of the specimens at Cambridge.

Without assuming that my opinion will settle the matter at all, I may say that it seems that they are two distinct species. The colour of the legs and of the abdomen is quite different. The two specimens from Georgia that Williston mentions [Syn. App., 292] may and may not be the true *flavidipennis* of Macquart. It is very doubtful. The less shining abdomen would seem to favor the conclusion that they are, while the more concave face would point to an opposite conclusion.

There are known in collections specimens of this species as follows: In the Loew type collection, at Cambridge, two specimens; in the U. S. National Museum, eight specimens, six from Texas and two from Georgia; in Mr. C. W. Johnson's collection, at Philadelphia, several specimens from Texas; and in the collection of the University here, one specimen from Blanco County, Texas;—this specimen has the pile everywhere pure white.

Chilosia prima, n. sp.

Female.—Eyes and arista bare (when magnified twenty diameters, the arista shows distinct hairs). Face not pilose, scutellum without distinct marginal bristles; legs almost entirely yellow.

Front distinctly trisulcate, sparsely punctured, shining black, with moderately long whitish pile more abundant between the lateral sutures and the eye margin. Occiput opaque, white pubescent, except near the eye margin, where it is shining olivaceous and pilose. Face shining black; viewed from in front, covered, except broadly on the tubercle, with very fine pubescence (viewed from the side it appears bare); very deeply concave below the antennæ and indistinctly so below the tubercle, with a few short hairs between the facial sutures and the eyes. Tubercle round, subacute, shining, much more prominent than the antennal elevation, situated below the middle of the face. Epistoma not projecting, in profile obliquely truncate at apex, lower margin straight and horizontal. Cheeks narrow, coloured and provided with pile like the face. Proboscis large, flabellate, dark ferrugineous; palpi cylindrical. Antennæ and narrow margin of the orifices bright reddish-fulvous, first joint slightly darker, second with a few short dark bristles, third joint somewhat longer than broad and a little flattened above and below, large and nearly oval. Arista basal, black, micro-pubescent, not incrassate. Humeral callosities ferrugineous, inwardly silvery pollinose. Dorsum slightly metallic, sparsely punctured, more coarsely so posteriorly, with sparse erect light yellow pile. Pleura shining olivaceous, with very sparse whitish pile. Scutellum coarsely punctured, black, rather long pilose and with slightly stronger hairs on the border. Abdomen robust, distinctly expanded on segments two and three, sparsely but distinctly punctured, with short sparse yellowish pile, everywhere shining except a broad median stripe on the second segment. This stripe has a small shining area in its middle anteriorly. There is a general, almost indiscernable, purplish cast to the abdomen. Venter shining, polished anteriorly, light yellowish pilose, the apical margins of the segments reddish. Legs light fulvous, with moderately long whitish-yellow pile; middle and posterior coxæ black; the apical joint of all the tarsi, and a large spot on the outside of the posterior tibiæ, brownish. Claws black, pulvilli whitish. Wings hyaline, veins testaceous, apical cross-vein parallel to the margin of wing, meeting the third vein at an acute angle. Tegulæ and narrow base of the wing distinctly yellowish. Long. corp., 11 mm.; L. alae., 8.5 mm.

One specimen [Philadelphia, Pa., 9-4-91], collected by Prof. C. W. Johnson. The type is now in his collection.

This species falls in the group with bare eyes and arista, which includes as North American species, *capillata*, Loew; *comosa*, Loew;

nigripennis, Will. ; *versipellis*, Will. ; *parva*, Will. ; *leucoparea*, Loew ; *tarda*, Snow ; and *lucta*, Snow. From all these, except *parva*, Will., it is easily separable by the colour of the legs, which are almost entirely yellow. From *parva* it is separable by the abdominal markings as well as by the much larger size.

Chilosia Townsendi, n. sp. [To Prof. C. H. Tyler Townsend.]

Male.—Eyes bare, arista very long plumose, face not pilose, scutellum with very distinct bristles, third joint of antennæ quadrangular, one and one-fourth times as long as broad, slightly concave above, the angles scarcely rounded.

Pile of vertex long, black. Front unisulcate, very slightly shining, black pilose. Eyes contiguous for one-half their width. Antennæ small, ferruginous, apical third of third joint darker. Arista situated at extreme base of the joint, obscurely reddish, long plumose except at the extreme apex. Face covered, except broadly on the tubercle, with short appressed whitish pubescence, everywhere slightly shining, in profile distinctly concave below the antennæ. Tubercle below the middle, very obtuse, more projecting than the antennal prominence. From tubercle to epistoma, which is projecting, deeply concave. Epistoma beneath almost horizontal, in front obliquely truncate. Cheeks coloured and pubescent like the face, narrow with a transverse sulcus in the middle. Occiput olivaceous dull silvery pollinose. Proboscis very small. Humeri obscurely reddish-white pubescent. Dorsum subopaque on the side, shining, with erect black pile which grows into bristles posteriorly and laterally. Pleura shining olivaceous with erect yellowish pile. Scutellum shining, finely punctured, with very long distinct bristles on the margin and a fringe of white pile below, elsewhere it is black. Abdomen with sides nearly parallel, laterally with dense, bushy pile, which is white, except at the posterior corners of segments three and four. On the top the pile is sparse, black in the middle and yellowish at the sides. First segment entirely, narrow anterior margin of the second and third, shining metallic, fourth segment everywhere shining, but less metallic. Hypopygium shining, white pilose. Venter distinctly punctate, obscurely reddish laterally ; first segment shining white pilose and pubescent, second opaque with mixed black and white pubescence, third shining, black pubescent, and with very narrow posterior margin reddish. Legs black, mixed black and white pilose, all the trochanters, coxæ and narrow base and apex of the femora, posterior tibiæ except a wide median annulus and their tarsi

except the first and last joints, reddish; anterior and middle tibiae except wide median annulus and their tarsi except the apical joint, yellowish. All the femora have a fringe of strong black hairs on the apical portion of the posterior side. Claws, except their apical half, reddish. Wings long, everywhere tinged with brownish; veins all-brownish. Long. corp., 10 mm; al., 9 mm.

This species is very closely allied to *C. tristis*, Loew, but is easily separable from that species by the colour of the antennae and the form of the third joint, which is not at all "subrotundo," as well as by several other characters.

One specimen [Marin County, California; Haines], in the collection of Cal. Acad. of Science. It was kindly transmitted to me for examination by Mr. Chas. Fuchs, through the courtesy of Mr. H. H. Baer, of the Academy.

This specimen is the identical one referred to by Mr. C. H. Tyler Townsend, in the Proc. Cal. Acad. Sci., Ser. 2, Vol. IV., 611, under the head of *Chilosia*, n. sp.?

Allograpta fracta, O. S. Western Diptera, 331, 1877.

The type of this species, a single male, was captured by Baron Osten Sacken, at Santa Monica, California, February 20, 1876. Since then no record has been made of its capture. In the collection of the University of Nebraska is a single female specimen captured at Los Angeles, California, November, 1887, by Prof. Bruner. It differs in no respect from Osten Sacken's description of the male. The front is yellow laterally and the first segment of the abdomen has the sides as well as the anterior margin yellow.

It is quite a remarkable fact that of the two specimens of this species known in collections, the latter one was captured in exactly the same locality as the type, though eleven years later.

Metogramma parvula, Loew.

This species has been recorded from Florida and Georgia only. There is a male specimen in the collection of the University, labelled Orizabo, Mex., Jan., '92; Prof. Bruner. It agrees exactly with the description, except that the black of the second segment of the abdomen is entirely shining and that the third and fourth segments have the black markings very obscure, but like the typical ones in outline. Two other specimens from St. Augustine, Florida, collected by Mr. C. W. Johnson, of Philadelphia.

A careful study of this material seems to make it clear that *M. Boscii*, Macq., and *M. parvula*, Loew, are one and the same species. Absolutely the only differences in the descriptions of these two species are in the markings of the abdomen, and they are notoriously variable in the species of this genus. In *Boscii* the first segment is black and the anterior half of the second is yellow; in *parvula* the anterior margin of the first segment is yellow and the anterior margin of the second is black. Now, one of these specimens shows a very narrow yellow anterior margin on the first segment, and the other specimen has it entirely black, but in both the second segment is black on the anterior margin. Such a combination of the only characters that separate these species in individual specimens seems to make their identity certain.

Mesogramma marginata, Say.

One specimen from Orizabo, Mexico; Jan. This species has been recorded from all parts of the United States and from several points in Mexico.

Baccha Tarchetius, Walker.

There has been recorded only one specimen of this species besides the type in the British Museum; this one was from New Jersey [Mr. Keen] and is now in the National Museum. In the collection of the University are two specimens—one from Philadelphia, Penn., and the other from Mobile, Ala.—both taken by Mr. C. W. Johnson, and from his collection. They are both females and differ from the description of the male in having two yellow spots similar to those on the third segment on the fifth. In all other respects the description applies exactly.

Baccha clavata, Fabr.

This species is a common one in the Southern States. It has been recorded from Georgia, Florida, Arizona, and two localities in New Mexico; Schiner mentions it "aus Süd-America." The capture of a specimen at Lincoln is therefore quite remarkable and gives the species a very much enlarged range. This specimen, a male, was taken near the flowers of a species of aster growing near the water, in September, by the writer. The larva of this species is a very beneficial one in districts where oranges are grown, as it feeds on the aphids that often infest the trees.

Baccha notula, Loew, *Diptera Americae septentrionalis*, Cent. VII., 65, 1861.

MALE.—"OCHRACEOUS; VERTICAL TRIANGLE AND SPOT ON THE FRONT, BLACK; DORSUM OF THORAX, EXCEPT LATERAL BORDER, DARK OCHRACEOUS, MARKED MEDIALY WITH A GREENISH-BLACK STRIPE; ABDOMEN WITH DARK LINES; WINGS INFUSCATE, TOWARDS COSTA LUTESCENT.

"Head luteous; occiput cinereous; vertical triangle black; front opaque, black pilose, and with a minute black spot; frontal lunule naked, near the antennæ black. Antennæ ochraceous. Face light ochraceous, semi-transparent, entirely shining. Thorax ochraceous; dorsum, except the wide lateral margins, dark fuscous, with two median lines abbreviated posteriorly and double lateral marks shining virescent. Scutellum ochraceous; metanotum bronzy-black; pectus marked with black. Abdomen ochraceous, with fuscous longitudinal lines; hypopygium bronzy-black. Legs ochraceous; apical third of posterior femora and posterior tibiæ, except a wide subbasal annulus, subfuscous. Wings infusate, towards costa yellowish; marginal and apex of the submarginal cells distinctly coloured with fuscous." [Translation.]

One specimen, a male, agrees in almost all respects with Loew's description. The coloration of the wings is much less marked, however. They are subhyaline, iridescent, costa tinged with testaceous. The posterior femora are testaceous except a dark annulus on apical third; the posterior tibiæ except basal third are dark. The abdomen is furnished with moderately long light pile, especially on the first and second segments. First segment, except a broad, uninterrupted band on posterior margin, yellow; second segment fuscous subtranslucent with a distinct light band just beyond the middle; remaining segments yellow, except the lateral margin and four slender black bands slightly expanded at the apex. Third joint of antennæ very short; oval.

One specimen [Charlotte Harbour, Florida; Mrs. Slosson]. This species was described by Loew, in 1861, from a specimen collected by Gundlach, in Cuba. The present is the first record of its capture since that time and the only record of its occurrence in the United States.

My thanks are due to Prof. Williston for aid in determining this specimen.

Eristalis latifrons, Loew.

This is a very widely-distributed and common species in the West.

Snow has recorded it from five different localities in Colorado and from four in New Mexico. Besides this, it has been recorded by Williston, from California, Kansas, Arizona, Texas, and Mexico, and from the latter locality also by E. Giglio-Tos. In the collection of the University there are numerous specimens from Lincoln and West Point, Neb., Custer, S. D., Los Angeles, Cal., and Lerdo, Mexico. The three female specimens from the latter locality are not in the least different from the others.

Several female specimens that are not otherwise different have a very large spot of brownish in the middle of the wing. One female specimen from Lincoln, Neb., lacks the opaque spots on the third segment of the abdomen, as did several male specimens from California that Prof. Williston mentions.

Eristalis Brousi, Will.

There are specimens in the collection of the University from Hot Springs, and Custer, S. D., Soda Springs, Idaho, and Laramie, Wyoming. One female specimen has the spots on the second segment of the abdomen yellow and distinct, as Snow has observed in other specimens. This species has been recorded from Alaska to Colorado and to New England.

Eristalis montanus, Will.

A male specimen collected at Soda Springs, Idaho, by Prof. Bruner, agrees exactly with Williston's description, except that the eyes are distinctly contiguous, and that the black of the third segment of the abdomen is not contiguous with that of the second; the margin of the second segment posteriorly is yellow slightly tinged with reddish. The type specimen of this species, a single male, was captured at Como, Wyoming, at an altitude of 7,000 feet. The present is the only record of its capture since that time. A female specimen taken also at Soda Springs, at an altitude of 5,000 feet, on flowers near the water, in August, shows the following differences from the male, which have never been described: The second segment of the abdomen has the black as wide on the posterior margin as on the anterior; the posterior margin black, third segment mostly shining black, with sides broadly yellow, with an anterior spot and narrow posterior margin opaque; fourth like third, except no opaque spots; fifth entirely shining black. The front is black with yellow pile, and the vertex is black pilose. Otherwise it is exactly like the male.

Eristalis hirtus, Loew.

This is a very widely-distributed and common species all over the West. It has been taken at four different localities in Colorado, as well as New Mexico. The collection here contains numerous specimens taken at Custer, South Dakota.

Eristalis flavipes, Walker.

There are two specimens of this species in the collection of the University. One of them, a male, captured at Lincoln, Nebr., is a typical form; another, a male, captured near Lake Winnipeg, on the Saskatchewan River, in Canada, by Prof. Bruner, in September, is Loew's *E. melanostomus*, or, as it is now considered, *Eristalis flavipes*, var. *melanostomus*, Loew.

It is worthy of note that this species is predaceous, quite anomalously among the *Syrphidae*. The latter of the two specimens just mentioned was captured sucking the substance of a small grasshopper, *Chloraltis curtispennis*, which it held in its grasp after the manner of many of the *Asilidae*.

Pteroptila cincta, Drury.

Two males and one female from Jamaica, W. I., have the abdomen and scutellum entirely of a strong reddish colour. The hypopygium is large and shining red. Collected at Portland, Jamaica, by C. W. Johnson, of Philadelphia.

Mallota cimbiciformis, Fall.

There is a specimen in the collection of the University taken at Milford, Nebr., in June.

There is another specimen that is very difficult to place. It was taken in War Bonnet Canyon, Sioux County, Nebr. Williston has described a species, *M. Sackeni*, that differs from *cimbiciformis* only in having the eyes separated in the male, and the wings marked with a distinct brown spot. There is perhaps also this difference, viz., that in *Sackeni* the marginal cell is closed in the margin, while in *cimbiciformis* it is distinctly open. Williston states, in litt., in reply to a letter in which I expressed some doubt as to the right of *M. Sackeni* to stand as a species: "The question of the 'art recht' of *M. Sackeni* is doubtful. I found specimens, however, from Mexico agreeing perfectly with the type specimen (a note of which I made in the Biol. Central Amer.), and thus continued the name. It is not at all improbable that the species runs into the older species, and that the name can only be used with a varietal meaning."

The specimen above mentioned has the eyes distinctly separated, and would hence fall into *M. Sackeni*. But the wings are not more distinctly marked than in *M. cimbiciformis*, the marginal cell is distinctly open, and the last segment of the abdomen is covered with long erect yellow pile, while in *Sackeni* the abdomen is entirely black pilose. These points together would seem to make it distinct from that species, although the very strong character of the eyes being separated would make it that. It differs from all the forms of *M. cimbiciformis* in the above-mentioned pilosity of the abdomen, and in the separation of the eyes. I have consulted almost a dozen different descriptions of *M. cimbiciformis*, which it is more than probable represent all of the different variations, and invariably the abdomen is described as entirely black pilose, except the first segment. There is a further difference in the form of the face below. After thus stating the case, and exercising all the care that should be exercised in erecting a new species in a genus where the synonymy is already immensely complex, I feel justified in describing the specimen as new.

Mallota facialis, n. sp.

Male.—Antennæ obscurely reddish, shining except the third joint, arista yellow. Wide facial stripe and cheeks shining. Face white pubescent and pilose, strongly projecting below, so that a line from the tip of the tubercle to the tip of the epistoma would have a distinct outward slant; the epistoma projects distinctly further than the antennæ [the outline of the face is quite different in the other species of this genus]. Eyes bare, very narrowly separated. Pile of thorax and scutellum bright yellow. Thorax black, scutellum translucent. First segment of the abdomen but little shining, whitish pilose; second and third segments shining, and everywhere covered with short, stiff black hairs; fourth shining bronzy, everywhere covered with abundant long, bright yellow pile. Legs black, all the tarsi, and tips of femora strongly and fore and middle tibiæ entirely and basal half of posterior tibiæ weakly reddish. Posterior tibiæ without spur. Wings very slightly marked with brown at the separation of the second and third veins.

One specimen [War Bonnet Canyon, in extreme North-western Nebraska].

Xylota analis, Will.

There are known specimens of this species as follows: In the U. S. National Museum, one male from Cala. [Baron], and two females from

New Mexico [Gauger], which form the types of the species; in the collection of the Kansas University, two males from the Magdalena Mountains, in New Mexico [Snow]; and in the collection of the University of Nebraska, one male, taken in War Bonnet Canyon in the extreme north-western part of Nebraska. This last specimen agrees exactly with Williston's description except that the antennæ are entirely red.

Xylota flavitibia, Bigot.

This species has been recorded from Colorado, by Williston, and from Colorado and New Mexico, by Snow. The collection of the University contains one male specimen taken in War Bonnet Canyon, Nebraska.

Xylota fraudulosa, Loew.

The collection of the University of Nebraska contains numerous specimens taken near Milford, Neb., in June, on the flowers of *Prunus americanus*. It has also been recorded from several localities in the East, and from Illinois, Wisconsin, and Washington, in the West.

Xylota angustiventris, Loew.

This species has been recorded from New York, Penn., and Ill., but not hitherto west of the Mississippi River. A single male specimen from War Bonnet Canyon, in extreme North-western Nebraska, has the wings hyaline, the third segment of the abdomen shining, except a very broad posterior band which projects almost to the anterior margin. The fourth segment is entirely shining.

Xylota obscura, Loew.

There is in the collection of the University of Nebraska, one female specimen taken in War Bonnet Canyon, Nebr. This species has been recorded from Oregon, California, and the Red River of the North. The description applies exactly.

Spilomyia quadrifasciata, Say.

One female specimen taken at Lincoln, Nebr., in September, by the writer. With the exception of the record of several specimens in Eastern Kansas, by Snow, this species has not been recorded outside of some of the extreme Eastern States. This specimen was taken on the flowers of *Aster multiflorus*.

Sphocomyia vittata, Wied.

In the University collection there are two specimens, one from Belmont, Nebr., and the other from War Bonnet, thirty miles distant. This species has been recorded from the Eastern and Southern States, and Minnesota and Colorado, in this country, as well as from localities in Northern Europe and Siberia.

PIERIS RAPÆ AND AGRAULIS VANILLÆ.

BY W. G. WRIGHT, SAN BERNARDINO, CALIFORNIA.

P. Rapæ, the introduced "European cabbage butterfly," on its westward march across this Continent, was first taken in Nebraska on August 3, 1881. (See CAN. ENT., 1882, 39.) In May, 1883, I took one male in Southern California. At that time I did not know its name, but I spread it and placed it in my cabinet as unknown. In a few years an Eastern Entomologist called on me, and at once identified it as P. Rapæ. It was yet other years before I saw another specimen in flight, though collecting diligently every season. About 1890 or '91 other specimens were observed, and thereafter every year brought them in rapidly increasing numbers, till now they are extremely abundant, flying early and late in the day, and early and late in the spring and fall, and at times, as in cold or cloudy weather, when only a very few of the native species can fly, indicating that it is more hardy than the native species, and that it will eventually dominate. As might be expected, the larvæ feed in good part on cabbage plants, but yet they are not at all dainty or particular as to food, and many other plants are used. Last year I raised some fine specimens from eggs laid on leaves of common nasturtiums, in the garden, and wholly fed upon those leaves.

The native Pierids, P. Protodice, P. Beckeri, and P. Sisymbri, do not oviposit on any cultivated plant so far as I know, preferring wild plants, while Rapæ apparently prefers cultivated ones. Evidently Rapæ will in a few years become a great pest. Already they fly in numbers everywhere, but especially about the Chinese vegetable gardens, and the flower gardens and dooryards of the towns.

Another introduced butterfly is that beauty from the Southern States, Agraulis Vanillæ. This species came into California over the Southern Pacific Railroad soon after trains ran through from Louisiana, or say in 1885. I well remember the first ones I ever saw. There were two of them in a front dooryard feeding on the flowers, and I was in a buggy driving along the street; but my net was handy, and I instantly went in pursuit of the red beauties, capturing them both as a first move, and explaining to the surprised people of the house afterward. Now Vanillæ is everywhere in evidence, and its larvæ are so abundant that large old passion vines are sometimes wholly denuded of leaves by them. Vanillæ is also extremely hardy and vigorous, flying, like Rapæ, at unfavourable times and seasons, as if bent on conquest. Still, it has not increased so rapidly during the last few years as has Rapæ.

These two species are the only ones as yet brought into the State from the East.

ON THE POSITION OF THE GENUS DEMAS.

BY HARRISON G. DYAR, PH. D., NEW YORK.

In the March number of the CAN. ENT., pp. 81-82, Mr. Tutt falls back upon the writings of Dr. Chapman to support his position for this genus as among the Liparidæ*. As Mr. Tutt has thus gracefully retired from the discussion without making a direct answer to my facts, I can only, in reply, briefly notice Dr. Chapman's position.

In the egg of Demas, Dr. Chapman, on a matter of detail, seems to imply an absence of relation with the Apatelidæ; but the fact remains that the egg is vertically ribbed as in the Noctuidæ, Apatelidæ, and Thyatiridæ, which I take to be the essential character. The Lymantriidæ, which belong to the Notodontian-Lasiocampid series have smooth, or obscurely reticulated eggs, the vertical lines having no tendency to become prominent.

In the young larva, Dr. Chapman has not discovered the peculiar arrangement of the warts, on which I lay special stress. He would ally Demas to Liparis on "the abundance of hairs and their length, the character of the tubercles, the anterior trapezoidal being more important than the posterior and the colouring." The hairs and colouring may be dismissed at once, as they are notoriously adaptive and variable characters. The statement about the tubercles is surprising. While it is correct of Demas as figured, the reverse is strikingly the case in many Lymantriids. The anterior trapezoidal (tubercle i.) in this group have a marked tendency to disappear, and I can only suppose that Dr. Chapman has made some mistake. His own figure of *Dasychira pudibunda* (pl. ix, fig. 8) shows the anterior trapezoidals clearly the smaller. The structure in Demas really tells in favour of my view.

In the second skin, Dr. Chapman describes a medio-dorsal depression on joints 5 to 11 and 12 "in the position of a peculiar organ in various Liparids." I see no good reason for the inference that these are the homologues of the dorsal eversible glands of the Lymantriidæ. In the first place they seem not to have any indication of the structure of such glands, and in the second place they are not homologous in position. In the Lymantriidæ, the glands occur on the 10th and 11th segments only; when others appear on the anterior abdominal segments, as in *Stilpnotia salicis* and *Lymantria dispar*, they are paired, not single.

*The name Lymantriidæ, as this family "appears to be called by American authors," was adopted by me from Mr. G. F. Hampson's Moths of India.

Dr. Chapman then remarks that in the further skin the larva has a more Liparid-like general appearance. The "appearance" is to me, however, not Liparid, but Arctian. When I first saw the larva, years ago, I took it for *Halisidota Harrisii*, till I noticed the different arrangement of the hair-pencils.

Next, he states that the habit of living between spun leaves is not that of an Acronycta. It is, however, decidedly so of our *Charadra deridens*, one of the Apatelidæ. But if *Demas* stood alone in this respect it would form no valid argument to remove it from the Apatelidæ, so slight and little specialized is the habit, evidently a recent adaptation.

As concerns the pupa, I do not pretend to be so conversant with the subject as Dr. Chapman is, and therefore his positive statement that "the pupa of *D. coryli* is not that of a Noctua" is entitled to consideration. However, I do not find the statement in "The genus Acronycta and its allies," a little book containing reprints of these articles, kindly sent me by Dr. Chapman, nor do I notice the positive characters which would lead to such a conclusion. Indeed, Dr. Chapman admits that "the character of the anal armature has some resemblance to various Noctua forms." But, indeed, suppose that the pupa be really "not that of a Noctua," the fact could only be applied to this discussion if it were shown that the pupæ of the other Apatelidæ were true Noctuæ pupæ, since it is equally true that the larva of *Demas* is "not that of a Noctua"; but neither are those of any other Apatelidæ. Now, Dr. Chapman says, speaking of the pupæ of the genus *Apatela*: "The pupa is less characteristic [than the larva]; it serves rather to divide the genus . . . than to define the group as a whole. The pupa of the *rumicis* group is very characteristic and rather bombyciform in its aspect. The others are more of an ordinary Noctua pattern, but present features that separate them from other families. This is a somewhat rash statement to make, since I must confess my knowledge of Noctuæ pupæ is of a rather superficial character."

These are all the points which I can gather from Dr. Chapman's account, and I do not think that they go far to refute my position, drawn from positive structural characters in the larva. Indeed, I should not feel called upon to criticise Dr. Chapman's interesting and valuable papers, except to examine the grounds of Mr. Tutt's position.

SOME ARGYNNIDS OF PARK CITY, UTAH.

(Elevation, 7,000 feet.)

BY ARTHUR J. SNYDER, EVANSTON, ILL.

Any time before the middle of June, entomological studies in the mountains are apt to be interrupted by snowfalls; but from that time to September, one will seldom find a better or more interesting place for study. The climate is delightful, and though the common opinion is that no rain falls upon the great plateau, here as elsewhere, suppositions are not facts.

My brief experiences (covering portions of two summers) would indicate that Utah receives as much rain during July and August as the State of Illinois. During the latter month, in 1893, there were frequent showers, and at least two heavy rains. In July, 1895, we experienced a very rainy day, and several showers. Nevertheless, at times it becomes so dry on the mountains that one must seek the low, irrigated meadows to find butterflies abundant.

The genus *Argynnis* is well represented in the West and North-west. From low lands to an elevation of 9,000 feet one finds many representatives.

The most striking species, as to colour and size, which I have found there is *A. leto*. This insect must be seen alive to be fully appreciated. Whether seen on the wing, or resting on a thistle blossom, it is a prize well worth the collector's attention. It appears in Utah (Park City) early in July, and its numbers gradually increase, until in August it may be called almost common. As is so frequently the case, the males appear first, and were found in the ratio of ten to one as compared with the females.

Mr. Maynard says *Leto* is found in California, Nevada, Oregon, Washington, and Montana. It has been my good fortune to capture it in Utah, Idaho, and Wyoming. I do not know how far East it has been taken, but my friend, Mr. William S. Bates, took several specimens of a female *Argynnis*, which I am satisfied are *Leto*, in Michigan during the past summer, and I have heard that it has been taken in Minnesota. I have never read that the female of *Leto* is dimorphic, but would not be surprised to learn that it is, or that *Leto* and *Cybele* are, or were at some time not far distant, one and the same species.

It is not difficult to secure eggs of *Leto*, and were it not for the fact that the larvæ hibernate, there would be no difficulty in rearing the

species. I believe Mr. W. H. Edwards has done so. Females confined over fresh violets oviposited readily, and in 1893 a number of larvæ were brought to Illinois, and subjected to "the cold-storage process" for the winter. In the spring, however, they failed to awaken from their lethargic condition.

A. eurynome was very common on low lands near Park City. At least 600 were taken in 1893. In one open meadow covered with flowers there were thousands of this species. Two forms or varieties were found, the ordinary one with silvered spots below, and a variety with all the spots below yellow. The ratio was about one yellow form to twenty-five of the silvered. A remarkable fact was noted. A silvered ♀ and a yellow ♂ were taken in *coitu*; a yellow ♀ and a silvered ♂; a silvered ♀ and a silvered ♂, and also a yellow ♀ and a yellow ♂. I am *positive* of all the statements except the last concerning the yellow ♀ and yellow ♂.

We know that peculiar specimens are sometimes the result of hybridism. Melanism may result from cold, drought, etc., and almost everyone has seen "sports" in the insect world.

I await with interest the results of future study concerning these subjects. It is commonly asserted that hybrids are never fertile. Is this *known* to be true?

A. myrina was abundant in the meadow mentioned above, but I do not remember having seen it elsewhere in Utah.

A. epithore was found on low ground flitting among the leaves of a large canna-like plant. One specimen also was taken beside a small mountain stream.

A. kremhild was taken in the same locality.

A. egleis was taken on a hillside near town, in an open spot, where the sun's rays seemed to linger at eventide, but near the underbrush where it was easy to escape among the scrub oaks and sage bushes. In its habits it much resembles *A. coronis*.

A. coronis was rare at Park City, but more common in the mountains, near Salt Lake City and Ogden.

A. Nevadensis and *A. Meadii* were also rare at Park City, but more abundant near Salt Lake. In habits they were quite unlike *coronis* and *egleis*, always being found on the flowers or else crossing swiftly to some place where flowers were more numerous, never dropping to the ground and flitting below the sage bushes, but seeking escape in swift flight. They also seemed to prefer lower ground,—the valleys instead of the hillsides.

A. montivaga.—One specimen taken.

A. Edwardsii.—Only one specimen taken.

A. liliana.—Only one specimen taken. Mr. W. H. Edwards says that the *A. coronis* and *A. nevadensis* taken in Utah are larger than ordinary. To my mind the *A. coronis* taken in Utah are unlike those taken in Colorado, both as to size and colour, but I have seen very few of the Colorado specimens.

In my collection are a number of *Argynnis* which seem to be unnamed.

For identification of specimens I am indebted to Prof. G. H. French, Dr. Henry Skinner, and Mr. W. H. Edwards.

My studies of this group lead me to believe that it sadly needs revision; that when it is studied carefully by someone who has facilities for comparing all the species and varieties described, many so-called species will prove to be synonymous; that when all the species have been bred and the stages studied, some surprising truths will be unearthed.

With a collection containing thirty-five species (?) and several varieties (?), I am willing, for the present at least, to say "don't know" to many things concerning the genus. I am anxious to find out something and contribute my mite towards unravelling the remarkable tangle.

LUNA EGGS—A CORRECTION.

Mr. Dyar kindly points out that the eggs mentioned by me on page 79 of the March number are not those of *Actias Luna*, as stated, but are those of *Telea Polyphemus*. He adds that "Luna eggs are quite different, being almost entirely black, and laid in little clusters on the twig, not on the leaf." Not having bred these moths from the egg, I had to rely on such descriptions as were at hand. Rogers [CAN. ENT., VII., 199] describes the eggs of Luna as "dark brown or chocolate colour, flattened at the sides, smooth, and about .05 of an inch in length; the sides were of a lighter shade." Saunders [Sixth Ann. Report, 41] says of *Polyphemus*: "The egg is about one-tenth of an inch in diameter, convex above and below, with the convex portions whitish and the nearly cylindrical sides brown." Minot [CAN. ENT., II., 27] also describes Luna eggs as very dark sepia, although some were almost entirely white. My eggs appeared to me to answer better to the description of those of Luna, and as the difference in method of attachment to food-plant was not given, I came to the conclusion that they were those of Luna, as the moth is usually abundant in the grove of hickories where the eggs were obtained.

W. HAGUE HARRINGTON.

A CANADIAN TRIGONALYS.

BY W. H. HARRINGTON, F. R. S. C., OTTAWA.

Trigonalys Canadensis, n. sp.

Male.—Length, 10.5 mm. Black with yellowish markings. Head transverse, as wide as thorax, about twice as wide as long when viewed from above; face above the antennæ, and vertex, polished, impunctate, without apparent sutures and with sparse blackish pubescence; the cheeks and under surface with pubescence more dense; clypeus polished; palpi slender; antennæ as long as head and thorax, rather stout, eighteen-jointed, segments subequal; eyes small but prominent; ocelli small, in a triangle on a line with the posterior margins of the eyes. Thorax rugose with coarse, irregular punctures, those of the pleura and pectus smaller and more numerous; posterior angles of prothorax yellow; legs rather slender, coxa and femora black, remainder yellow, the tips of tibiæ and tarsi somewhat dusky; wings subhyaline, with dark stain covering marginal cell and extending slightly beyond each end of it, stigma and costal nervures black, remaining nervures reddish, second and third submarginal cells subequal; scutellum abruptly rounded posteriorly, post-scutellum yellow, prominent, subpyramidal, notched at apex, in suture on each side several deep shining foveæ; metathorax very short and rounded at sides, without prominent angles, a small yellow spot on each side. Abdomen polished, impunctate, apparently with six segments; second segment as long as all the following and with a yellow central band, or elongated spot on each side; a yellowish spot at lateral base of segments 3 and 4, very faint on the latter; venter slightly pubescent, with double row of yellow spots on segments 1 to 5, largest on 2nd.

This is the first record of the occurrence of any member of the family Trigonalidæ in Canada, and I am indebted for the privilege of describing the specimen to Mr. Fletcher, who received it in Sept., 1893, from Mr. Wilkinson, of Victoria, B. C. It was taken from the cell of a wasp (probably *Vespa occidentalis*) which had built on his verandah, and he had observed that the wasps were rapidly decreasing in numbers, apparently from the presence of this parasite, and of a smaller species of hymenopteron, of which, unfortunately, no specimens appear to have been preserved.

ITHYCERUS NOVEBORACENSIS, FORST.

In former years I had found this beetle, the largest and most conspicuous weevil of our fauna, to occur only upon beeches, as noted in my sketch of the Rhyncophora, in Eleventh Annual Report. Such, also, was Mr. Chittenden's record [Ent. Am., Vol. VI., 168]. Its infestation of the twigs of oak had been recorded by Riley, who described the larva. Its occurrence upon hickory is noted by Mr. Beutenmuller [CAN. ENT., XXII., 201], and it is known as injurious to apple and other fruit trees. On June 9th, 1895, I observed a pair in *coitu* upon the trunk of a hickory (*Carya amara*), where there were no beech trees near by, and on carefully examining other hickories in the immediate vicinity I found five more pairs. Two or three days later I examined the same trees and could not detect a single beetle, nor did I find any on subsequent examinations. This shows that missing the exact date for such an insect might lead to its escaping observation entirely, as those trees had been examined in former years.

W. HAGUE HARRINGTON.

A CORRECTION.

For the new genus of Megalopygidæ, *Brachycodion*, described in the last volume of CAN. ENT., read *Aidos*, Hübner. The genus is not in Kirby's Catalogue, and I thus came to overlook it. The following is the synonymy:—

Genus *Aidos*, Hübner.

1818. Hübner, Verz. bek. Schmett., p. 191, No. 1962, *Brachycodion*, Dyar.

1895. Dyar, CAN. ENT., XXVII., 244.

Type *A. amanda*, Stoll.

I must apologize for this synonym by hastening to correct it.

HARRISON G. DYAR.

Through the kind consideration of Mr. A. R. Grote, the Society has been put in possession of his paper on the Apatelidæ, noticed by Dr. H. G. Dyar, in CAN. ENT., Vol. XXVIII., p. 86; also, the original photographs of the plates, beautifully executed, and greatly admired by all who see them. The form and ornamentation are displayed with remarkable life-like distinctness, even to the tubercles and rounded bodies of the larvæ, which are somewhat lost on the plates, but well defined in the photos, testifying to the great advance that has been made in this method of illustrating entomology since Mr. Grote first adopted it twenty years ago.

J. ALSTON MOFFAT.

NOTES ON NEW MEXICO AND ARIZONA HYMENOPTERA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

With the exception of some undetermined gallflies and parasites, the following list of 86 species contains all the Hymenoptera collected (and bred) by the author, in the South-west, of which it has proved possible to get the names, except four mentioned in CAN. ENT., 1892, p. 200. The gallflies and parasites above referred to will be recorded in some papers to be published in the future. The cottonwood, *Blennocampa*, mentioned in CAN. ENT., 1893, p. 304, and in Zoe, iii., pp. 234-236, should also be included in the above exception.

As the list is not large, the species are arranged alphabetically. The fact that I have not been able to refer to Cresson's catalogue explains this, as it does the absence in most cases of the authorities for the species.

In the four cases where the query and asterisk occur, two species got mixed under one number in sending for identification to *Ent. News*, so that it is uncertain to which the locality and notes belong.

Agapostemon melliventris, Cr.—La Vega de San José, Valencia Co., N. Mex., August 4. One. A small, elongate species, with head and thorax entirely vivid Paris-green colour. Abdomen, legs, and antennæ yellow, the hind borders of segments brown. Det., Fox.

Allantus uncinatus, Nort.—Hart Little Spring, Arizona, July 14. Seven specimens. Det., Fox.

Andrena, sp.—Las Cruces, N. Mex. One ♂. A moderately small, elongate, entirely black species. Wings slightly fuscous. Det., Fox.

Andrena, sp.—Las Cruces, N. Mex. One ♂. Clypeus white. A small, elongate species. Black; thorax and head whitish pubescent. Wings slightly smoky. Det., Fox.

Anthidium, sp.—Las Cruces, N. Mex., May 17. One ♂. A moderately small species with clear wings. Thorax with yellow border, except in front, and two delicate yellow vittæ. Abdomen black, with yellow hind border to each segment. Det., Fox.

Anthidium, sp. near *mormonum*.—Las Cruces, N. Mex. One. A small form, with wings clear. Abdomen black, with irregular yellow hind borders to segments, interrupted in middle on six segments. Det., Fox.

Anthidium interruptum, Say.—Chaves, N. Mex., August 6. Three. Las Cruces, N. Mex. One. Det., Fox.

Anthophora, sp.—Hart Little Spring, Arizona, July 14. One specimen. A grayish pilose bee, larger than *Megachile relativa* ♀, and with the abdominal bands of pile gray. Det., Fox.

Anthophora, sp., probably n. sp.—Chaves, Valencia County (near Los Lunas), N. Mex., August 6. One ♂. A species of moderate size, fulvous pilose, including first abdominal segment, rest of abdomen black with white or yellow hind borders to segments. Wings clear. Det., Fox.

Anthophora, n. sp.—La Vega de San José, N. Mex., August 4. One ♂. Wholly yellowish, whitish pilose, with clear wings. A rather large species. Det., Fox. (?) *

Anthophora maculifrons?—Las Cruces, N. Mex. One ♂. Small species, grayish cinereous pilose all over, only front border of abdominal segments 1 to 3 showing black. Pile on abdomen very short. Wings clear. Det., Fox.

Anthophora montana, Cr.—La Vega de S. José, N. Mex., August 4. Two specimens. Det., Fox.

Anthophora occidentalis, Cr., ♂.—La Vega de S. José, N. Mex., Aug. 4. One ♂. Wholly yellowish, whitish pilose, with clear wings. A rather large species. Det., Fox. (?) *

Anthophora Walshii, Cr., ♂.—La Vega de San José, N. Mex., Aug. 4. One. Clypeus white. Six abdominal segments with white hind margins. Det., Fox.

Braconid.—Grand Canyon, Arizona; Hance trail, July 11th. One specimen. A bright red species, with wings fuscous or black. Det., Fox.

Calliopsis, sp.—Las Cruces, N. Mex. Two. Det., Fox.

Cecris (sic *Cerceris*?) *venator*, Cr.—Chaves (near Los Lunas), N. Mex., August 6. One. Very like *Eucerceris*, sp., but basal abdominal segment smaller and black. Det., Riley.

Centris, sp. ♀ (♀ of *lanosa*?).—Las Cruces, N. Mex. One. Det., Fox.

Cerceris bicornuta, Say.—La Vega de San José, N. Mex., August 4. Two. Det., Riley.

Chalybion ceruleum, L.—La Vega de San José, N. Mex., August 4. One. A small bluish-black wasp, a common species in the Eastern U.S. Det., Riley.

Chelonus sericeus, Say.—Continental Divide, Tenaja, N. Mex., Aug. 2. One. A blackish saw-fly (?). Det., Riley.

Chlorion occultus.—La Vega de San José, N. Mex., Aug. 4. One specimen. El Rito, N. Mex., Aug. 5. One specimen. Det., Fox.

Crabro, sp.—Hart Little Spring, Arizona, July 14. One. A black, shining hornet, with abdomen banded with yellow, but no yellow on scutellum. Det., Fox.

Crabro, sp., near *Packardi*.—Hart Little Spring, Arizona, July 14. One. A black hornet, of narrowed form. Abdomen banded with yellow, legs yellow. Det., Fox.

Crabro delectus, Cr., ♂.—Continental Divide, Tenaja, N. Mex., Aug. 2. One. A small black and deep yellow hornet. It was infested with two dozen small rufous mites on dorsum of base of abdomen. Det., Riley.

Crabro minimus, Pk.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Cryptus, sp. aff. *americanus*.—Hart Little Spring, Arizona, July 14. One specimen. A good-sized black ichneumonid with red abdomen. Det., Fox. (?) *

Cryptus callipterus, Say, ♂ ♀.—Las Cruces, N. Mex. An ichneumonid. Two females and two males. One of the males is considerably smaller and more slender, and generally darker. Det., Riley.

Cryptus proximus, Cr.—Hart Little Spring, Arizona, July 4 and 14. Two specimens. Det., Fox.

[TO BE CONTINUED.]

BOOK NOTICES.

"Handbuch der paläarktischen Gross-Schmetterlinge für Forcher und Sammler," by Dr. M. Standfuss, Jena, 1896 (Verlag von Gustav Fisher).

This is a second edition of the "Handbuch für Sammler der europäischen Gross-Schmetterlinge" rearranged and enlarged by the addition of certain studies in the theory of descent; 392 pages, and eight coloured lithographic plates.

The author gives an extensive account of the methods of collecting, of breeding larvæ, pairing of imagoes, both of the same and of different species, etc., interspersed with interesting philosophical remarks. As the preface says, "this book unites in itself two objects: lepidopterological practice and scientific-zoological speculation." The special case of hybridization recounted in detail, on pages 66 to 107, represents a very neat piece of work. The author shows, by considerations of the

egg, larva, pupa, and imago, that the three Saturnias, *spini*, *pavonia* and *pyri*, differ in degree of specialization; that they are phylogenetically of different ages, *spini* being the oldest, or least specialized, and *pyri* the youngest form. The hybrid larvæ between the first two and last two are figured adjacent to the normal forms, and the greater resemblance of the hybrid to the more generalized form in each case is striking, thus neatly confirming the conclusions already reached, and all on the lines laid down by Weismann.

Our author also gives an account of experiments on the effects of different temperatures on hibernating larvæ and pupæ, with figures of some of the forms of imago produced. There is an account of variation, seasonal dimorphism, local forms, etc., discussed from the most recent scientific standpoint. The book contains much of interest which it is unfortunate that we are not able to enjoy more easily in an English edition.

HARRISON G. DYAR.

BRITISH MOTHS, by J. W. Tutt. London: George Routledge & Sons. Pp. 365.

The young collector in the British Isles will no doubt welcome this manual, which will not only help him to name any specimen that he may collect, but give him also much information regarding the habits of the moth in its preparatory as well as perfect stages. It is written in the author's well-known pleasant and readable style, and is not merely a dry handbook. There are twelve coloured plates and over sixty wood-cuts, illustrating the majority of the families. There are also a number of tables, giving the times of year when the species may be looked for in the egg, larval, pupal, and perfect states; the food-plant of the larva; the location of the pupa; and notes on the variety or abundance of the moth. It would have added much, we think, to the handiness of the book if it had contained comparative tables of genera and species as well.

RANDOM RECOLLECTIONS OF WOODLAND, FEN, AND HILL, by J. W. Tutt, F. E. S. London: George Gill & Sons. Pp. 256. [2s. 6d.]

We are glad to see that a second edition of this delightful little book on outdoor natural history has been called for. In this new issue the matter has been, to some extent, rearranged and revised, and its attractiveness has been much enhanced by a pretty cover and over a hundred excellent illustrations. Though it deals with "Old Country" scenes, and the insects, birds, and plants that frequent them, it can be read with great interest by any lover of nature in any part of the world.

REPORT OF OBSERVATIONS OF INJURIOUS INSECTS AND COMMON FARM
PESTS DURING THE YEAR 1895, WITH METHODS OF PREVENTION
AND REMEDY. Nineteenth Report, by Eleanor A. Ormerod, F.
R. Met. Soc., etc.

This splendid report fully sustains the high standard of excellence which has characterized Miss Ormerod's previous publications. The preface shows that the unusual and prolonged low temperature of the winter of 1894-95 had apparently but little affected the insects which it might be supposed to destroy.

The following pests are treated of in separate chapters: Apple, *Smerinthus ocellatus*; bean, *Bruchus rufimanus* and *B. fabæ*; cabbage, *Ceutorhynchus sulcicollis*; corn and grass, *Charæas graminis*, *Cetonia aurata*, *Phyllopertha horticola*, *Melolontha vulgaris*, *Rhizotrogus solstitialis*, *Tipula maculosa* and *Oscinis frit*; gooseberry, *Bryobia pratiosa*, *B. ribis* and *Nematus ribesii*; mangolds, *Aphis rumicis*, *Silpha opaca* and *Atomaria linearis*; orchard caterpillars, *Cheimatobia brumata*; pine, *Astynomus adilis* and *Retinia buoliana*; plum, *Scolytus rugulosus*; strawberry, *Harpalus ruficornis*, *Pterostichus madidus* and *F. vulgaris*; turnip, *Helophorus rugosus*.

The ravages of the bean weevil appear to have been serious, and those of the ground beetles, upon strawberry, have been more extensive than in previous years. Ninety-three pages are occupied with the discussion of the above mentioned insects, while fifty are allotted to "Flies injurious to horses, cattle," etc. These chapters are exceedingly interesting, and several species of Hippoboscidæ, Tabanidæ, and Cestridæ, which are very annoying and injurious to domestic animals, are fully and clearly discussed. In connection with the account of the attacks of the Forest Fly, *Hippobosca equina*, are given two magnificent plates showing upper and side views of the foot of this fly, the tarsi of which are so modified as to enable it to secure a most firm grip on the hairs of the animal upon which it alights. The report concludes with a chapter on Deer and Dog Ticks, very troublesome mites belonging to the Ixodidæ. W. H. H.





JOHN M. DENTON.

The Canadian Entomologist.

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JOHN M. DENTON.

It is with profound regret that we record the death of our old friend and highly-esteemed colleague, Mr. John M. Denton, of London, Ontario, who was one of the early members of the Entomological Society and always took a very lively interest in its welfare. For some months he had been in poor health, owing to an affection of the liver, but was able to attend his place of business from time to time, and to take part in the proceedings of our annual meeting in November last, when many of us saw him for the last time. In January his illness assumed a more acute form and confined him to the house. On Tuesday, March 24th, he was seized with paralysis and before midnight passed peacefully away.

Mr. Denton was born in Northampton, England, on the 19th of September, 1829. His father was a farmer by occupation, and he was consequently brought up in the country amidst rural scenes and learnt there to love and observe the beauties of nature. At the age of fourteen he was apprenticed to a woollen draper and tailor, and spent seven years in thoroughly learning the trade and becoming proficient in all its details. For a few years he was engaged in business on his own account, and in 1855 married Miss Ann Walker, of Somersetshire, England, who survives him. He then emigrated to Canada and settled in London, and at once resumed his occupation as a tailor, having but little to begin upon except a hopeful heart and a thoroughly practical English training. By patient industry, unflinching courtesy, and unswerving integrity, he built up by degrees a most successful business as a merchant tailor, and won the respect and esteem of the whole community.

Living on a farm in his boyhood and apprenticed at so early an age, he had but little opportunity of acquiring a literary education, but by constant application and careful reading he overcame these disadvantages

and attained a more than ordinary knowledge of the subjects that interested him. Foremost among these was Entomology, which he studied especially in its economic aspects as affecting live stock, fruit trees, garden and field crops. He became an authority on these topics, and was frequently called upon to address meetings of farmers and fruit growers and give them the benefit of his knowledge and experience. His love of the farm continued throughout his life, and he devoted much of the time that he could spare from business to the cultivation of a fruit farm a few miles from London. He was no mean authority upon horses and cattle and had a considerable knowledge of their diseases and most satisfactory treatment. He was also an adept with the microscope and took great delight in searching into the hidden beauties of nature.

When the London branch of the Entomological Society was formed in July, 1864, he was one of the original members, and took a most active interest in it and the parent Society to the close of his life. He was elected Vice-President of the London branch in 1872, and President in 1878 and several years following. In 1871 he became a member of the Council of the parent Society and continued to hold office for five and twenty years; in 1892 he was elected Vice-President, but he would never allow himself to be nominated for the Presidency, though urged to do so more than once. He was also an active member of the Ontario Fruit Growers' Association and gave much assistance to its work.

He was a man of deep religious feelings and of earnest but unobtrusive piety. Though a leader of the Plymouth Brethren, he never intruded his views upon those who differed from him. The writer knew him well for a great number of years, and during his visits to London often enjoyed his hospitality, but never did he hear a word fall from his lips that could wound in the slightest degree the susceptibilities of those who did not accept the theological opinions that were so dear to him. He was a good, honest, sterling man whom all respected and whom his friends loved; kind, charitable, and generous; courteous in manner, most hospitable in his home, above reproach in business; a man who is a distinct loss to the city in which he lived, and whose death creates a blank in the hearts of his friends which can never in this life be filled. To his childless, sorrowing widow we tender our deepest, sincerest sympathy.

CAPTAIN J. GAMBLE GEDDES.

It is our painful duty to record the loss of another active member of the Entomological Society of Ontario. At two o'clock on Good Friday morning, April the 3rd, Captain J. Gamble Geddes died after a few days' illness, brought on by a severe cold. He was born in Montreal in 1850, and educated there. When a young man he entered the service of the Molsons Bank and was for some time attached to the office in London. He at once joined the Society and became an enthusiastic member. In 1874 he was elected Secretary-Treasurer of the London branch; in 1875, Vice-President; in 1876, President. He left London on his appointment as manager of the agency of Molsons Bank at Millbrook. Here, living in the country, he devoted most of his leisure time to the collection and study of insects, applying himself especially to the Lepidoptera. In 1880 he left the Bank and was appointed Aide-de-Camp and Private Secretary to the Hon. John Beverley Robinson, during his term of office as Lieutenant-Governor of Ontario. Being fond of society, of handsome presence and devoted to music, he became a great favourite among the social circles of Toronto, among whom much of his time was accordingly spent. He did not, however, abandon the pursuit of Entomology, but succeeded, by correspondence and exchange, in addition to the captures of his own net, in forming a large and valuable collection of butterflies from all parts of the world. This he sold to the Dominion Government, and it now forms the nucleus of the collection in the Geological Museum at Ottawa. He made expeditions in 1883 and 1884, to Manitoba and the Northwest Territories, as far as the Rocky Mountains, in quest of butterflies, and added much to the knowledge of their geographical distribution and habits. On several occasions he visited England, and spent some time in Germany and also in Bermuda. Wherever he went he made the acquaintance of the leading Entomologists and added to his stock of knowledge.

His first contribution to this magazine was in 1874, when he wrote No. 14 of a series of articles on "Some Common Insects"—"The

Common Cockchafer," C. E., Vol. VI., p. 67. His subsequent papers were the following :—

"List of Diurnal Lepidoptera collected in the Northwest Territories and the Rocky Mountains in 1883," C. E., XV., 221; XVI., 56, 224; XVII., 120; one hundred and twenty-six species were enumerated.

"Euptoieta Claudia," C. E., XVII., 60 (1885).

"Notes on Three Small Collections of Diurnal Lepidoptera, made in 1886" [These were made in Newfoundland, the Kamanistiquia River, Lake Superior, and Hudson Straits], C. E., XVIII., 204.

"Some Notes on the Genera *Colias* and *Argynnis* whilst alive in the Imago State," C. E., XIX., 166 and 230 (1887).

"Notes for Collectors visiting the Prairies and Rocky Mountains," C. E., XXI., 57 (1889).

"*Colias Chione*," C. E., XXI., 59.

He also contributed the following articles to the Annual Reports of the Society :—

"Some Remarkable Captures in Ontario," 18th Report, 1877, page 21.

"On Some of the Collections in England and the German Empire," 22nd Report, 1891, p. 31.

"Insects Collected in Bermuda during the Winter of 1894," 25th Report, 1894, p. 25.

In addition to his love for Entomology, he took a great interest in Philatelics, and formed a large and valuable collection of postage stamps. He was an accomplished musician, and usually sang in the choir of the church that he attended; he was also a member of the Philharmonic Society of Toronto. He belonged to the Masonic Order, in politics was a strong Conservative, and in religion a member of the Church of England. His wife, who was a daughter of the late Edward C. Jones, of Toronto, died a little more than a year ago. The untimely death of Capt. Geddes was no doubt hastened by her loss. They have left two little orphan girls, aged three and five years respectively.

The writer, who knew him intimately from his boyhood, deeply deplores his loss, and his grief is shared in by a very large circle of relatives and friends.

TWO NEW SPECIES OF PAPIRIUS.

BY JUSTUS WATSON FOLSOM, CAMBRIDGE, MASS.

Papirius vittatus, n. sp.

Younger specimens dark purple above with pearly markings, lavender or lilac beneath; older ones maroon to almost black above, sides mottled with several shades of purple and brown. Head free, purple, with a broad, white transverse band across the front; oral region whitish; vertex with a distinct, white, sagittate mark from antennæ to prothorax; a black ocellus-like speck on the middle of the vertex; a few short bristles upon vertex and front; eyes dark, close behind antennæ upon a black patch narrowly surrounded by purple. Antennæ longer than the body, except in largest individuals, segments variable in relative length, but approximately in the ratio of 1:6:7:1:5 or 1:7:9:2; basal segments stout, as long as broad, brownish; with short, white bristles; second brownish at base, purple at middle, pearly apically, hairy distally; third purple, hairy, with obscure, whorled subsegments on apical half, broadening towards apex, penultimate subsegment swollen on one side; terminal segment purple, lanceolate in outline with five to seven distinct, whorled subsegments. Body ovate dorsally with a re-entering angle. Dorsum dark purple to blackish, with a pattern in pearly white, essentially as follows: On anterior half of dorsum a median longitudinal purple streak between two pearly streaks with dentate margins; behind these a squarish purple spot bounded by pearly and bisected by a short, median longitudinal, pearly streak; on either side, two short, irregular, pearly lobes extending obliquely forwards; next behind on the median line are one to three roundish purple spots broadly surrounded by pearly white; on posterior of abdomen a long, oblique pearly bar directed forwards from either side of the median line. Largest abdominal segment with a small, pale tubercle on either side of the middle. Dorsum naked anteriorly, with short white bristles posteriorly. Anal tubercle with bristles four times as long, and with a median longitudinal purple bar. Sides purple to blackish, with conspicuous hazel, chestnut and cinnamon mottlings. Thorax with a broad, lateral, longitudinal pearly band, sometimes replaced by one to four bright white spots. Sides of abdomen with two to five large, conspicuous, pure white spots, widely separated. Ventral surface lilac or lavender. Ventral filaments extensible to the length of the antennæ. Legs long, purple and yellow; tibia with broad alternate bands of dark violet and wax-yellow, white bristly. Claws

white; superior claw long, tapering, rather straight, six toothed; inner edge with two prominent teeth at about equal intervals; two more on both sides near the outer edge, dividing it into thirds; inferior claw half as long as the other, straight, tapering, bearing subapically a slender bristle longer than the claw, also a tooth upon a swelling on the inner edge near the base. Furcula almost reaching the head; manubrium stout, purple; dentes twice as long, slender, pale lilac, each with long white bristles on either side, and a single, extra long ventral, subapical bristle; mucrones white, less than one-third the dentes, narrowly elliptical, ventral concavity shallow, with distinctly serrate edges, apex clearly emarginate, having a median, rounded quadrate notch between two rounded teeth.

Maximum length, 3.3 mm. Described from over fifty specimens.

This species was found abundantly in February and March of this year, in a greenhouse at Cambridge, Mass., upon wet, decaying wood, and upon the outside of alga-coated flowerpots, especially in warm, moist and shaded situations.

P. vittatus is closely allied to *P. marmoratus*, Pack. I have examined the types of the latter species which have shrivelled and lost colour, yet show distinct, structural differences from *P. vittatus*, especially in the claws and mucrones. *P. marmoratus* has a longer, oblong mucro, not emarginate, but terminating in a distinct, rounded lobe; the distal spines of the dentes are clearly barbellate; claws shorter and stouter; the superior claw has four teeth much more obscure than the six of *vittatus*: an evident tooth on the middle of the inside, a second, obscure, midway towards the apex, and a pair of small lateral teeth near the outer edge, one-third from the apex; the inferior claw has a short, apical bristle, and is less dilated basally than in *P. vittatus*.

This species is easily recognized by the broad white head band, the sagittate mark, the three median dorsal streaks, and the brilliant white spots on the sides of the abdomen.

Papirius opalinus, n. sp.

General colour orange-rufous or ferruginous. Head, first two antennal segments, anal tubercle, and legs pale orange-ochraceous. Head with a few short bristles on front; vertex almost naked, swollen dorsally; eye spots black, often quadrate. Antennæ shorter than the body, from three-quarters to one-half as long, according to age; basal

segment twice as long as broad, naked; second three or four times as long, knotty, hairy towards apex; third purple, four or five times the basal, knotted, hairy except basally, obliquely dilated but squarely articulated at apex; terminal segment purple, half again the basal, lanceolate, moderately long, white, hairy. Body regular, elongate-oval in dorsal outline; anterior dorsum naked, translucent orange-ochraceous with a broad and long median shading of green due to chlorophyll in the stomach (lateral, convulsive movements of which are easily observable in living specimens); posterior dorsum and sides orange-rufous to dark ferruginous, often with a tinge of maroon, the general colour being due to the combined effect of minute orange-ochraceous and ferruginous mottlings; posterior dorsum with short white bristles upon minute, round, orange-ochraceous spots; anal tubercle hardly visible from above, bristly. Ventral surface pale yellow, with three pairs of smooth, buff-yellow tubercles: a small, rounded tubercle on either side the manubrium; a large, oval, oblique one either side the middle; a narrow, oblique pair anterior to these; ventral tube pale orange-ochraceous, transparent, buff-yellow inside at base; tube plus protruded filaments one-fourth longer than the antennæ. Legs slender; femur with sparse, short bristles; tibia paler distally, stout spiny at moderate intervals; claws white, very stout; superior claw of almost uniform width, little curved towards the mucronate apex, six toothed: inner edge with a tooth at the middle, and another midway between it and the apex; two pairs of lateral teeth, similarly placed near the outer edge; inferior claw two-thirds as long as the other, long triangular, tipped with a short bristle from a stout, straight midrib; inner edge sinuate or straight, with a short bristle one-third from base. Furcula short, reaching to ventral tube; manubrium extending beyond anal tubercle, sparsely hairy; dentes twice as long, stout, pale orange-rufous, with short, lateral bristles, and several longer, ventral bristles at regular intervals; mucrones white, one-fourth dentes in length, oblong, finely serrate beneath, apex rounded.

Maximum length, 1.6 mm. Described from over fifty specimens.

This species occurred abundantly with *P. vittatus* at the same time and place, feeding upon algæ on the outside of flowerpots, and, curiously, having the exact colour of the latter.

Types of the above species have been given to the Museum of Comparative Zoology at Cambridge, Mass.

LEPYRUS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PENN.

The species of *Lepyrus* in North America have not heretofore been well understood. The genus has recently been treated monographically by an American writer, several forms being described for the first time : one of these has since been discovered to be identical with the European *capucinus*, Schall, and *geminatus*, Say, to be *palustris*, Scop. To make these species better known is the object of the present paper, and the following synonymy and bibliography are presented :—

LEPYRUS PALUSTRIS, Scop., 1763, Entomol. Carniol, 33; *colon*, Linn., 1771, Mant., p. 531; Kirby, Faun. Boreal, IV., 197; Leconte, Mon. Rhyn., p. 127; *geminatus*, Say, Lec. ed., I., 273; *geminatus*, Casey, Ann. N. Y. Acad. Sci., VIII., 825.

In the work referred to, *colon* = PALUSTRIS, which to that time had been considered common to the two hemispheres, was suppressed, and the American form united with *geminatus*, the reasons being an alleged more elongate form, much larger and more transverse prothorax carinate along the middle, a carinate beak, and much sparser vestiture. The reasons assigned conclusively prove that the writer was not well acquainted with the European form as a whole, nor even with the American. Such differences do exist, but they are merely individual and apply equally well to the extremes of the individuals of either continent. Here it may be remarked that the European examples usually seen in collections rarely fairly represent the species, being mostly the largest and more conspicuous, which are the most uniform and least characteristic : that most frequently seen here being the form with a long cylindrical sub- or non-carinate beak. That the individuals of this species are very variable in Europe is evident from the number of named varieties in the catalogue, and that the same holds good here may be seen in any collection containing examples from all parts of the Continent where it inhabits. Before me are fifty examples from several localities in Europe (Italy, Austria, Switzerland, France, Portugal), exhibiting great diversity in form, size, sculpture and vestiture, but finding counterparts in the American forms before me from Massachusetts, New York, Canada, Michigan, Indiana, Wisconsin, Missouri, Kansas, Colorado (Greely, Garland), Nebraska, Manitoba (Winnipeg). The only constant characters I have yet discovered among these diversified forms are in the mesosternum, which is flat between the coxæ, a little narrower and more triangular in the male than in the female; and in the tibial situation of the

femora, with a small mucro internally (sometimes not very evident). Where these characters are found, however diverse the forms, specific unity is indicated.

Before drawing comparisons, it will give better results to note the differences among the foreign forms, and for contrast, that approximating most closely the American as described by Kirby is selected for description.

Alate, surface black, clothed with gray, hair-like scales, an oblique stripe on each side of the thorax, a spot on the fourth interval of the elytra in front of middle, and a row of spots on each side of the abdomen of longer, denser white scales; the femora also annulate with white; the abdominal spots are more frequently yellow, and often the stripes on the thorax. Head densely squamulose, finely and closely punctate, a linear fovea between the eyes; antennæ with the first joint of the funicle short and thick, second longer and attenuate to base, scape attaining the eye or not, according to the length of the rostrum; beak a little longer than the thorax, cylindriciform, a little dilated in front of the insertion of the antennæ, densely squamulose, finely and closely punctate, carina fine, attaining the frontal fovea or not. Thorax coniform, narrowed, more or less sinuously, from base to apex, where it is slightly constricted and about two-thirds as wide as at base, one-fourth wider than long; disk irregular, often flattened and uneven, densely punctato-rugose, varying from fine to coarse; sides coarsely tuberculo-rugose, median carina ending in the basal depression sometimes abbreviated, sometimes obsolescent. Elytra three-fourths wider than thorax, about one-half longer than wide, apices mostly separately acuminate and porrect, sometimes conjointly rounded with a slight notch, serial punctures variable in size and closeness, intervals mostly even, sometimes the third, fifth and seventh wider and elevated. Femora mostly armed with a small spine; mesosternum flat, more or less triangular.

The following individual variations may be noted:—

Rostrum.—Varies from about as long as the thorax to one-fifth longer, sometimes strongly cylindrical in the longer beaked, in which the carina is weak and frequently apical; more quadrate in the shorter beaked, with the carina stronger, often attaining the fovea.

Antennæ.—In examples with short rostrum the scape reaches the eye, but not in those with it elongated.

Thorax.—One-fourth to one-fifth wider than long, sides often a little dilated at apical third; other variations are mentioned in the description.

Elytra.—The serial punctures may be large and irregularly spaced or smaller and closer; examples of the same length vary in the median width of the elytra one-sixth of the width or more; the humeral angles are usually rounded to thorax, but not infrequently full and obtusely angulate. Other variations are noted in the description.

Vestiture.—In the form described it is long, hair-like, and moderately evenly distributed over the surface; in other forms it is so short as to but imperfectly conceal the surface; in others both lengths occur; the colour varies from uniformly cinereous to uniformly yellowish-brown, the

intermediates being variously tessellated or spotted with white, brown, yellow, and gray scales irregularly intermixed ; the thoracic stripes, the elytral and abdominal spots, and the spots frequently seen on the apical protuberances vary from white to yellow.

Femora.—The internal angle of the sinuation for the tibia is nearly always armed with a minute spine in all the femora, but to be seen in some examples requires close observation, and seems occasionally to be obsolete.

Contrasted with the European *palustris* as a whole the American completely harmonizes, while at the same time it is just as variable and might likewise be separated into varieties ; there might be a var. *Kirbyanus*, a var. *geminatus*, etc.

The rostrum, while mostly shorter, with the scape attaining the eye, is occasionally as long as in any of the European examples ; it is usually stouter, more quadrate and with a stronger carina, but these differences are not constant. The thorax in general offers few points, the most noticeable being that the median carina is usually stronger and seldom absent. The elytra while variable individually in regard to the serial punctures, form and punctuation of the elytral intervals, do not differ in these respects from what is seen in the European. The form vestiture and coloration are in no way different. The mesosternum and femoral armature are identical. These two characters with the forms of the first two joints of the funicle are very constant in every variety of both countries and the only ones yet discovered which can claim absolute specific value.

This species varies in length from .26 to .45 inch. I have taken it in Canada on the willow, and it is said to occur likewise on the aspen (*Populus*). It seems to be the species most commonly met with ; besides the places heretofore mentioned, it is reported from Louisiana and Illinois.

The question has been asked : With what species did Dr. Leconte compare *geminatus*, since *colon* has the tips of the elytra acuminate [Mon. Rync.]? I can only say that it may have been an example of *colon* with the tips conjointly rounded, which sometimes occurs ; or it may have been *capucinus*, in which they are habitually rounded and which is labelled *colon* in some collections. Say's *geminatus* had a white spot on the elytra, Dr. Leconte's a yellow one. In some collections all examples with the spot white are labelled *colon* ; all with it yellow

geminatus; in collections containing *capucinus*, which is not very common, that species is labelled *colon*; and all others *geminatus*, without regard to the colour of the elytral spot, and again that is labelled *geminatus* and all others *colon*.

L. CAPUCINUS, Schall., *alternans*, Casey.—Length, .36-.45 inch. Habitat—Michigan, New Hampshire, Maine.

Black, apterous, form robust, vestiture variable. Rostrum stout, longer than the thorax, sulcate on each side of the carina which attains the frontal fovea or not, closely, unevenly, partly confluent punctured; scape of the antennæ attaining the eye or not, the first and second joints subequal in some examples, the second much longer in others, probably sexual differences. Thorax transverse, wider than long, sides parallel to apical third, then rapidly rounding to apical constriction, apex one-fourth narrower than base; sub-convex, surface even, a slight depression in front of scutellum, closely covered with granuloid tuberculations small on the disk, larger and rugous on the sides; median carina fine, mostly attaining the base. Elytra oval, in general one-half longer than wide, two-thirds to three-fourths wider than thorax; striate, striae obscured by the vestiture, but when denuded, deep and narrow, with a row of punctures in the bottom; intervals either regular and evenly spaced or irregular with the first and third wider, the others perceptibly narrower and slightly furrowed along the middle; the granuloid tubercles vary from excessively fine to moderately coarse; apices conjointly rounded. The anterior femora in the male have the tibial sinuation rectangularly laminate on the upper side, and usually the middle and posterior; mesosternum elevated between the coxæ. The vestiture is variable, but mostly of gray and whitish elongate scales evenly intermixed, sparse, not concealing the black surface, the usual median spot on the elytra absent, but a white one on each apical protuberance, the abdominal spots wanting or only traceable in a few denser white hairs. In an example from New Hampshire the vestiture is mottled and denser, the abdominal and median elytral spots present.

In the European examples seen (all males) there are no abdominal nor median elytral spots, and the vestiture is that first described. The fuller description of the present species, with more ample material than that of Mr. Casey, has reduced the alleged differences between this and *Canadensis*, Casey, to this: Striæ not distinctly punctured, *Canadensis*; striæ distinctly punctured, *capucinus* (*alternans*). This seems to be too small a difference, all other things being equal, on which to base a species, especially in a genus where the individual characters are so instable.

LEPYRUS PERFORATUS, Casey.—While this species in form is similar to *palustris*, and with the same form of ornamentation, yet it is structurally different; the femoral sinuation is gradually rounded, not spinose as in *palustris*, nor angulate as in *capucinus*; the mesosternum is sub-elevated, not flat as in the former, nor so prominent as in the latter. The general vestiture is very short and sparse, not concealing the tubercular rugosities and variously tessellate with minute, denser, pale scales; the elytra and under side are covered with distant, small, polished black

tuberculoid granules, much larger on the thorax ; the intervals are slightly alternately narrower, sometimes on the same plane, sometimes the narrower deeply depressed, producing a costate appearance ; the serial punctures are large and unevenly spaced ; the apices are conjointly rounded with a slight notch. This species is fully as large as *gemellus*. The examples seen are from Vancouver Island and the high mountains of British Columbia.

Mr. Casey has described some forms which have not been seen.

L. OREGONUS, the describer states, differs from *palustris* (*geminatus*) in the more elongate form, much smaller and less transverse prothorax, longer and almost non-carinate beak, coarser serial punctures, and more prominent sutural angles of the elytra. Habitat—Oregon.

L. PINGUIS, Casey, is said to differ from *geminatus* by its more obese form, stouter beak and coarser punctuation, more exposed humeri, more declivous elytra and denser vestiture. Habitat—Colorado (Rocky Mountains).

L. ERRANS, Casey, is described from a unique taken in the mountains of New Mexico, near Abiquire, in which the elytral intervals are separated rather by striae than by series of punctures, alternately narrower and depressed, the narrower more finely sculptured and clothed with denser brown squamules ; the elytra tessellated with patches of denser pale scales, and the usual median spot not distinguishable. The beak is longer than the thorax, with a broad and feeble carina.

L. CANADENSIS, Casey.—As stated under *capucinus*, this species should probably go into synonymy, but the form has not been seen and there may be some really specific structure not mentioned by the describer. The length is given at .44 inch, and the habitat, Canada (North-west).

L. GEMELLUS, Kirby.—This species is only mentioned to complete the genus ; it is not nearly related to any of the others ; more elongate, elytra longer with four or five broad elevated interspaces separated by striae-like impressions, each interspace with a depressed linear furrow, roughly scalerous, lines of denser white scales on the intervals simulating vittae ; thoracic stripes and abdominal spots white, median elytral spot absent ; mesosternum as in *perforatus*, the femoral sinuosity a little more abrupt. Length .40-.50 inch. Habitat—Vancouver Island to Hudson Bay.

Though the genus has but recently been treated monographically, after disposing of *geminatus* and *alternans*, it was thought it might be useful to state briefly the characters assigned to the other species, as in all probability the large majority of the readers of the CANADIAN ENTOMOLOGIST will never see the memoir alluded to.

The genus *Lepyryus* affords grand opportunities for the creation of species to entomologists who form them on the same basis as those of rocks and minerals.

THE MALE OF MONODONTOMERUS MONTIVAGUS, ASHM.

♂.—About $4\frac{1}{2}$ mm. long, moderately dull brassy-green (about the colour of some species of *Dolichopus*, which it superficially resembles); third abdominal segment above blackish; tips of femora, and whole of tibiæ and tarsi, reddish-ochreous. Wings hyaline, veins dark brown. Antennæ black, scape greenish. Head rather finely punctate, rather broad, eyes prominent, vertex somewhat flattened. Antennæ rather short, scape very peculiar, irregularly reniform, the distal swelling largest; flagellum uniformly cylindrical, except the tip, which is transversely flattened. Thorax narrow, strongly punctate. Parapsidal grooves deep and complete. Scutellum with a transverse furrow, and its posterior margin occupied by a ridge which is foveolate above. Tegulæ green. Stigma bifurcated; post-marginal vein nearly twice as long as stigmal. Posterior femora beneath very finely denticulated, with one large tooth about the beginning of its distal fifth. Abdomen narrow, shining; first segment smooth on dorsum, remaining segments finely transversely striate. Second segment extremely narrow on dorsum.

Hab.—On leaf of *Populus*, sp., campus of N. M. Agricultural College, Las Cruces, N. M., May 8, 1895. (Ckll. 2945.)

This species was described from a ♀ taken by the writer at West Cliff, Colorado. The ♂, now first described, seems to differ considerably, and I should never have referred it to the same species, but for the fact that Mr. Ashmead assures me that the identity is certain. According to Howard's synopsis of the genera of Chalcididæ, it would not go into *Monodontomerus*, which has the posterior femora smooth beneath, except for the large tooth. The insect is a parasite of wild bees.

T. D. A. COCKERELL.

THE CIGAR CASE-BEARER OF THE APPLE (*COLEOPHORA FLETCHERELLA*).

BY JAMES FLETCHER, OTTAWA.



FIG. 12.—CIGAR CASE-BEARERS AT WORK—NATURAL SIZE.
(Figure copied from Cornell Bulletin, No. 93, by M. V. Slingerland.)

In 1889 I received from the late William Brown, of Charlottetown, P. E. I., some larvæ of a small case-bearer, which he had found in large numbers upon his plum trees, and which also occurred in his pear and apple orchards. Since that time this insect has made itself well-known by its injuries in apple orchards in various localities in the Maritime Provinces, and in the Provinces of Quebec and Ontario. A beautifully

illustrated and carefully prepared bulletin has been issued by Mr. M. V. Slingerland, of Cornell University Agricultural Experiment Station, in which the life history of this most interesting but very serious enemy of the fruit grower is fully described. The above illustration, kindly lent by the editor of the Canadian Horticulturist, is copied from that bulletin.

The localities in Canada where this little pest has been most injurious are situated along the northern shore of Lake Ontario and the St. Lawrence. Dr. Young, of Adolphustown, in whose orchard of Duchess of Oldenburgh and Russet apples the first important occurrence of this insect as an apple pest was observed, states that they were first noticed in his orchard about 1885. Reports of its ravages have also been received from Oshawa, Port Hope, and Maitland, Ont., in all of which places it had an appreciable effect on the yield of the orchards.

The life history may be summarized as follows: The eggs, which are described by Mr. Slingerland as beautiful objects, are of a delicate light lemon-yellow colour, deeply pitted with triangular depressions separated by narrow ridges. They are very minute, and are deposited by the females among the hairs of the new shoots and on the under sides of the youngest leaves. The egg stage lasts about two weeks, the little caterpillars emerging in the latter half of July. For the first period of their lives they are miners feeding on the inner tissues of the leaves. After two or three weeks they make small, rather flat and elongated, curved cases, in which they pass the winter. These cases, inside which they live and which they carry about with them, are made of pieces of the upper and lower skins of the mined part of the leaf, lined inside with silk. The two surfaces of the leaf are easily recognizable on the cases from the pubescence of that side which was taken from the lower surface. Soon after making these winter cases, the caterpillars, now about a quarter grown, migrate to the twigs of the tree and fasten themselves securely to the bark. In badly infested orchards they are sometimes found clustered in hundreds around the fruit spurs.

As soon as growth begins the following year, about the beginning of May, the case-bearers crawl out to the opening buds, and at this time

their injuries are considerable, as they attack not only the young leaves, but also the flower buds. The winter curved cases are retained for a short time in spring, and are enlarged by the addition of small pieces of the skin of the leaves attached to the orifice, but after two or three weeks are discarded and another kind of case is made of the same material. This summer case, from which this insect takes its name, is shaped exactly like a miniature cigar. It is brown and very tough; the upper end is contracted abruptly into a three-limbed, star-shaped orifice, the lips of which fit closely together. Through this hole the excrement of the caterpillar is ejected, and ultimately the pretty little steel-gray moth will make its exit. The full-grown caterpillars, which are orange coloured, with black heads and dark feet, four millimetres in length, change to dark brown chrysalids inside the cases about the end of June, and the moths appear about three weeks later.

REMEDIES: The Cigar Case-bearer, when numerous, is a serious pest of the apple tree, and occasionally also of the pear and plum. The most injury results from the young caterpillars early in spring attacking the unexpanded buds, and later the flower stems, the forming fruit, and the foliage.

The results of experiments show that this insect can be controlled by spraying with Paris green and kerosene emulsion; but very thorough and persistent work is necessary. The best results have followed spraying the infested trees very early in the spring with kerosene emulsion, and repeating the operation once or twice at short intervals, four or five days later. The first application may be made with the standard Riley-Hubbard emulsion reduced with only five parts of water. After the leaves expand, the emulsion should be diluted with nine parts of water. Good results have also been obtained by spraying with Paris green (Paris green, 1 lb., quicklime, 1 lb., in 200 gallons of water). Now that the operation for spraying fruit trees with different compounds for the destruction of injurious insects and fungi is getting to be generally adopted by the best fruit growers throughout Canada, the only change necessary in the advised methods will be to spray rather oftener where this insect is known to occur.

NEW AMERICAN PARASITIC CYNIPIDÆ (ALLOTRIINÆ).

BY CARL F. BAKER, FORT COLLINS, COLO.

All of the species described below were taken in Colorado. For most of the specimens I am indebted to the industry of my wife, who has done a large amount of work with the sweep net in Northern Colorado. No American species have yet been described as belonging to any of the genera mentioned, though some of the species described under *Allotria* may possibly be referable to some one of them. A number of species of *Allotria* in my collection are left until such time as the already described forms are more fully elucidated.

Phaenoglyphis, Forster.

This genus is separated from *Allotria* by the parapsidal furrows and scutellar fovea.

Phaenoglyphis americana, n. sp.

Male.—Shining black, legs and antennæ honey-yellow. Length, 1 mm. Antennæ 14-jointed, approximate at base, sockets twice as far from eyes as from each other, reaching beyond the middle of the abdomen; joint 2 as long as 1, 3 twice as long and distinctly bent inwardly, 4 and 5 somewhat shorter than 2; apical joint long, conical, and blackish at tip. Oral region castaneous. Face, prothorax above, mesonotum at sides, scutellum, metathorax and base of abdomen with fine white hair, longest on the scutellum. Parapsidal furrows distinct, not approximate behind, gently diverging anteriorly and extending the entire length of mesonotum. Scutellum with a large semicircular fovea at base. Metanotum opaque and with two longitudinal carinæ, which are equidistant from each other and the lateral margins. Tegulæ piceous. Wings as long as whole body; median vein obsolete; radial cell closed, two and a-half times long as wide; appendix below long, slender, straight, and slightly knobbed at end; radius extending somewhat beyond juncture with marginal vein. Cubital and discoidal veins faintly outlined. Fort Collins; May.

Dylita, Forster.

Under this genus I describe several species in which the radial cell is open for a greater or less distance on the anterior border, and in which the radius is narrowly rounded at tip and does not reach the margin of the wing. Some of the species resemble quite closely various species of *Alloxysta*, but in that genus the radius spreads out irregularly at tip, and there is no appreciable space between it and the margin of the wing.

The following characters are common to all the species described below: Antennæ reaching to between middle and tip of abdomen. Pubescence very sparse, except on metathorax and base of abdomen, where it is short and thick, and on scutellum, where it is long and thin. Prothorax below, a triangular sclerite below tegulæ, and metathorax, opaque and minutely roughened. Tegulæ piceous. Wings as long or slightly longer than the whole body; median vein obsolete.

Dylita bicolor, n. sp.

Female.—Shining black, legs honey-yellow, antennæ piceous beyond joint 4. Length, 1.25 mm.

Antennæ 13-jointed, sockets at middle of face and as far from eyes as each other; flagellum becoming distinctly wider and heavier toward the tip; antennal joint 2 three-fourths the length of 1, 3 equalling 1 in length, 4 and 5 subequal in length to 2; apical joint becoming wider for about two-thirds its length, then rapidly narrowing to a point; four basal joints same colour as legs. Oral region rufous, palpi honey-yellow. Radial cell long, triangular, two and a half times as long as wide, terminal abscissa of radius broadly rounded, appendix below short, strongly bent, knobbed at tip. Fort Collins; June.

Dylita ruficeps, n. sp.

Female.—Shining black, head and antennæ beyond joint 4, dark rufous; legs honey-yellow. Length, 1.25 mm.

Antennæ 13-jointed, sockets above middle of face, nearer to each other than to the eyes; flagellum but little wider toward the tip; joint 3 somewhat longer than 1, 2 three-fourths the length of 3, 4 and 5 subequalling 2 in length; apical joint evenly narrowed to a point and much longer than anteapical. Mandibles honey-yellow, piceous at tips and bidentate. Palpi sordid white. Radial cell triangular, two and one-third times as long as wide, terminal abscissa of radius strongly irregularly bent, appendix below long, angularly bent at extremity. Fort Collins; June.

Differs from *bicolor* in size, colour of head, antennæ, and venation.

Dylita affinis, n. sp.

Female.—Length, 1.25 mm. Closely related to *D. ruficeps*, from which it differs as follows: Head of same width, but shorter, of a very pale bright rufous, with the space between the ocelli dark. Joint 4 of antennæ nearly as long as 3, and slightly longer than 2; sockets above middle of

face, distance between them equalling distance to eyes. Appendix below radial cell long and straight. Fort Collins; September.

Easily separated from *ruficeps* by the above characters.

Dylita coloradensis, n. sp.

Male.—Black; head, prothorax, and all pleuræ, pale rufous; antennæ and legs honey-yellow. Length, 1.5 mm.

Antennæ 14-jointed, sockets above middle of face, as near eyes as each other; flagellum not enlarging toward the tip; joint 2 three-fourths of 1, 1-3-4 and 5 subequal; apical joint conical and not longer than anteapical. Metanotum with two distinct carinæ which converge slightly anteriorly. Radial cell triangular, little more than twice as long as thick, terminal abscissa of the radius somewhat curved, appendix below long, straight, gradually enlarged toward the extremity. Fort Collins; June.

Readily distinguished from the above species by coloration.

Dylita similis, n. sp.

Male.—Length, 1.5 mm. Very similar to *D. coloradensis*, from which it differs as follows: Space between ocelli dark. Antennæ becoming piceous beyond joint 4. Radial cell longer and more pointed, two and one-half times as long as wide, terminal abscissa of the radius nearly straight, appendix below curved. Fort Collins; September.

Alloxysta, Forster.

In this genus (or subgenus) the radius reaches the anterior margin of the wing, but the radial cell is open anteriorly. The following characters are common to all the species described below: Antennæ reaching to between middle and tip of abdomen, sockets at middle of face, as near eyes as each other. Pubescence very sparse, except on metathorax and base of abdomen, where it is short and thick, and on scutellum, where it is long and thin. Prothorax below, a triangular sclerite below tegulæ, and metathorax, opaque and minutely roughened. Tegulæ piceous. Wings as long or slightly longer than the whole body; median vein obsolete.

Alloxysta robusta, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow. Length, 1 mm.

Antennæ 13-jointed, piceous beyond joint 4; flagellum strongly enlarging toward tip; joints 1, 2 and 3 subequal in length, 4 and 5 somewhat shorter than 3; apical joint conical, longer than anteapical. Oral

region rufous, palpi honey-yellow. Abdomen short but very deep, the depth half again the length. Radial cell large, long triangular, length two and a half times the width, terminal abscissa of the radius gently curved, appendix below bent. Fort Collins ; June.

Alloxysta longiventris, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow ; head with vertex piceous, all below pale rufous. Length, 1 mm.

Antennæ 13-jointed, dark rufous beyond joint 4 ; flagellum strongly enlarged toward tip ; proportions of antennal joints as in *robusta*. Metanotum with two longitudinal carinæ which converge slightly anteriorly. Abdomen nearly as long as the thorax, slender, upper and lower lines subparallel. Radial cell small, short triangular, length two and a third times the width, terminal abscissa of the radius strongly curved, appendix below straight. Fort Collins ; May.

In the form of the abdomen this species differs widely from any other Allotriid I have seen. The abdomen of *A. robusta* differs from the normal form in exactly the opposite direction.

Alloxysta magna, n. sp.

Female.—Large, robust ; shining black ; antennæ at base and legs honey-yellow ; head rufous, slightly darker above. Length, 1.6 mm.

Antennæ 13-jointed, piceous beyond the fourth joint ; flagellum subfiliform, scarcely enlarging toward the tip ; joints 1, 3 and 4 subequal, 2 about three-fourths as long, apical joint conical at tip, longer than the anteapical. Metanotum with two longitudinal carinæ which converge slightly anteriorly. Abdomen globular, as deep as long, and scarcely pointed behind. Radial cell large, triangular, length two and a half times the width, terminal abscissa of the radius strongly curved, appendix below short and straight. Fort Collins ; June.

The largest species I have seen, and with the abdomen more nearly globose.

Alloxysta gracilis, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow ; head pale rufous. Length, 1.25 mm.

Antennæ 13-jointed, piceous beyond joint 4 ; flagellum subfiliform ; joint 3 equals one in length, 2 three-fourths as long, 4 and 5 somewhat shorter. Abdomen from the side subtriangular, strongly pointed behind. Radial cell of medium size, two and a half times as long as wide, terminal

abscissa slightly curved, appendix below heavy and straight. Fort Collins; September.

Differs from *magna* in size, shape of abdomen, etc.

Alloxysta apicalis, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow, head pale rufous; abdomen light reddish-brown, black at tip. Length, 1.4 mm.

Antennæ 13-jointed, piceous beyond joint 4; flagellum slightly heavier toward the tip; joints 1, 3 and 4 subequal, 2 a little shorter; apical joint conical at the tip, longer than the anteapical. Abdomen from the side subtriangular, pointed behind. Radial cell large, two and a half times as long as wide, terminal abscissa slightly curved, appendix below slender, strongly knobbed at the tip. Fort Collins; September.

Readily recognized by the peculiarly coloured abdomen.

Alloxysta rufipleura, n. sp.

Male.—Shining black, antennæ at base and legs honey-yellow; head, prothorax, and all pleura bright rufous. Length, 1.25 mm.

Antennæ 14-jointed, dusky beyond joint 5; flagellum subfiliform; joints 1, 3 and 4 subequal, 2 a little shorter, 3 somewhat swollen at the apex beneath; apical joint conical, little longer than anteapical. Abdomen from side subequilaterally triangular, strongly produced and pointed below. Radial cell of medium size, two and one-half times as long as wide, terminal abscissa of the radius strongly curved, appendix below rather long and emarginate on the proximal side. Fort Collins; June.

Separated from all the above species by the partially rufous thorax.

Alloxysta abdominalis, n. sp.

Female.—Dark shining piceous, abdomen and thorax lighter; head and metathorax rufous; antennæ at base and legs honey-yellow. Length, 1 mm.

Antennæ 13-jointed, piceous beyond joint 4; flagellum slightly enlarged toward the tip; joints 3 and 4 shorter than 1 and but little longer than 2; apical joint slender, conical, very long, a half longer than the anteapical. Abdomen from the side subequilaterally triangular. Radial cell shorter and broader than in *rufipleura*, the terminal abscissa of radius gently curved, appendix below slender, curved, knobbed at tip. Fort Collins; June.

Resembling *rufipleura*, but differing in size, and antennal and wing characters. It is hardly possible that this could be the female of *rufipleura*.

NOTES ON BEES OF THE GENUS *PROSOPIS*, WITH
DESCRIPTIONS OF NEW SPECIES.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Prosopis affinis, Sm.

Twenty-four male and female specimens sent to Mr. Cresson in 1887 were identified as this species. Since that time I have regarded it as a variable species, and in my last paper (Trans. Am. Ent. Soc., XXII., 116) indicated it as a synonym of *P. modesta*, Say. I now think there are two species, closely allied, but characterized as follows:—

Prosopis affinis, Sm., ♀.—Black, head and thorax opaque, closely punctured; abdomen almost impunctate, first segment smooth and shining, lateral apical margin with a patch of whitish pubescence; flagellum testaceous beneath; subtriangular mark on each side of face, two spots on collar, tubercles, spot on tegulæ, edge of wing base beyond tegulæ, and base of all the tibiæ, lemon-yellow; enclosure of metathorax strongly rugose at base; wings hyaline. Length, 5–6 mm.

♂.—Resembles the female; first segment of abdomen less shining, more punctate, apical margins of segments subtestaceous and subfasciate; face below antennæ, ascending broadly on each side nearly to summit of scape and notched around insertion of antennæ, labrum, mandibles, except rufous tips, concave exterior edge of scape, two spots on collar, spot on tegulæ, edge of wing base, tubercles, tarsi, and tibiæ, except a spot behind anterior and middle pairs and ring on posterior pair, lemon-yellow. Length, 5–6 mm.

Illinois; 16 ♂, 11 ♀ specimens.

Four males differ only in having no yellow on scape; one of these also without a spot on tegulæ.

I think there is no question but that this is the *P. affinis* of Smith, but the male described by him probably does not belong to it. If, however, this should prove to be distinct from *P. affinis*, the name of *Prosopis zizie* is proposed for it.

Prosopis modesta, Say, ♀.—Closely resembles the female of *P. affinis*; wing a little more dusky, the extreme base without yellow, tegulæ rarely with a small spot in front. Length, 4–6 mm.

♂.—Scape stout, not strongly concave exteriorly, as in preceding; first segment of abdomen less punctate, more smooth and shining; face below antennæ, narrowing to a point on each side at eye margin; two

spots on collar, tubercles, anterior tibiae in front, middle and posterior pairs at base, and the tarsi, yellow; the tarsi paler. Length, 5-6 mm.

Illinois; 24 ♂, 27 ♀ specimens.

Thirteen male specimens agree with the description; six have a yellow line on mandibles; five have a yellow spot on labrum; three have no spots on collar; two have spots on tegulae, and one has the scape yellow exteriorly. Twenty-two female specimens have the tegulae immaculate; five have small spots on tegulae in front, two individuals of these showing the spot only on one side. This is the commonest species in my neighbourhood. I have taken the sexes in copula. This is the *P. affinis* of Cresson (Proc. Bost. Nat. Hist., xii., 270).

Smith mentions a spot on tegulae in *P. affinis*, while Say does not mention it in *P. modesta*. It is quite probably that Say's description was based on specimens taken in Indiana. This is the only species taken here which agrees with his description. What Say described as the male belongs to *P. pygmaea*, Cr. The female of *P. pygmaea* usually has a spot on tegulae, but not on collar.

Prosopis pygmaea, Cress.

Of twenty-seven female specimens taken here (Carlinville, Illinois), all except nine show a spot on clypeus, two showing three spots; only one shows no spot on the tegulae; all have spots on tubercles and side of face, and no spots on collar. The females without spots on face and tubercles are referred to next. (See Trans., XXII., 116.) Of twenty-three males, fourteen have no spots on tegulae, while two show no spots on tubercles and are without the yellow club-shaped extension of the facial markings.

Prosopis sanicula, n. sp., ♂.—Black, opaque, the abdomen more shining; head and thorax closely and rather finely punctured; abdomen almost impunctate; enclosure of metathorax more rugose than in *P. pygmaea*; form slender; scape very broad, club-shaped; flagellum beneath and apical margins of abdominal segments somewhat testaceous; a subquadrate spot on clypeus, a smaller spot above, a narrow line on each side of face, anterior tibiae in front, middle and hind pairs at base, and the tarsi, yellow; face on each side near insertion of antennae with a rounded depression which is smooth and shining; wings hyaline, nervures and stigma dull testaceous. Length, 4-5 mm.

♀.—A narrow line on each side of face, sometimes wanting, and the tibiae at base, yellowish. Length, 4-5 mm.

Illinois; four ♂, three ♀ specimens.

Prosopis Illinoisensis, n. sp., ♂.—Black, head and thorax opaque, densely, rather strongly and coarsely punctured; abdomen shining, especially the first segment, which is impunctate, the remaining segments finely punctured; metathorax rather strongly rugose; scape stout; face below antennae, widening above on each side and somewhat notched about their bases, small spot on labrum, and sometimes on mandibles, two spots on collar, tubercles, anterior and middle tibiae in front, hind tibiae entirely, and the tarsi, yellow; wings dusky toward tips. Length, 6 mm.

Illinois; three ♂ specimens.

NOTES ON NEW MEXICO AND ARIZONA HYMENOPTERA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. MEX.

(Continued from page 112.)

Diodontus occidentalis, Fox.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Diadasia enavata, Cress.—Las Cruces, N. Mex., August 19. Two. Clypeus black. Det., Fox.

Elis (Dielis) plumipes, Drury.—Las Cruces, N. Mex., August 19. Two. Det., Riley.

Epeolus, sp.—Chaves, N. Mex., August 6. One. A moderately large hornet-shaped species, most beautifully velvety all over, entirely black below, including legs. Thorax black, with circular border light velvety yellow extending on pleura. Abdomen black with light velvety yellow cross-band on segments 1 to 4, those on segments 1 and 2 on hind portion near hind border and projected laterally forward, on first segment the lateral yellow also projected inward on anterior edge. Wings smoky. There seems to be very short pubescence on the thorax, but that on the abdomen is extra short, or is, as it appears, pollen. Det., Fox.

Epeolus occidentalis, Cress.—Turkey Tanks, Arizona, July 18. One specimen. A small hornet-shaped species, with thorax black and yellow vittate, abdomen black and yellow banded, wings slightly smoky, and legs fulvous. Det., Fox.

Eucerceris, sp.—Grant, Valencia County, N. Mex., August 3. One. A yellow and black chrysiid-like hornet. Det., Riley.

Evania, sp., ♂.—Las Cruces, N. Mex., September 9. One. A small blackish and rufous gall-fly (?), with immense thorax and very small pedunculate abdomen. Det., Riley.

Gorytes dentatus, Fox., n. sp.—Grand Canyon, Arizona; Hance trail, July 11. One specimen. A small rufous and yellow hornet. Wings hyaline, anterior pair brownish near tip. Det., Fox.

Halictus ligatus, Say.—Hart Little Spring, Arizona, July 14. One specimen. A small blackish bee. Det., Fox.

Hedychrum violaceum, Brullé.—Chaves (near Los Lunas), N. Mex., August 6. One. El Rito, N. Mex., August 5. One. Det., Fox.

Ichneumon comes, Cress.—San Francisco Mt., Arizona, July 15. One specimen. A black ichneumonid with two yellow bands on abdomen at base, and fulvous-yellow legs. Det., Fox.

Megachile, sp.—Chaves (near Los Lunas), N. Mex., August 6. One specimen. A moderately large species, mostly black; nearest to following species, but with more elongate abdomen, and slightly stouter. Det., Fox.

Megachile, sp.—Las Cruces, N. Mex. One. Clypeus black. ♀. Chaves, N. Mex., August 6. One. Det., Fox.

Megachile relativa, Cress., ♀.—Hart Little Spring, Arizona, July 14. One specimen. A grayish pilose bee, pile of abdomen fulvous and in bands, rest of abdomen showing shining black. Det., Fox.

Megacilissa gloriosa, Fox.—El Rito, N. Mex., August 5. One specimen. Large species, fulvous-yellow pilose, including first abdominal segment, rest of abdomen black with white pilose narrow hind borders to segments 2 to 4. Wings clear. This was a new species, recently described by Mr. Fox.

Megacilissa Yarrowi, Cr.—Las Cruces, N. Mex., August 21. One. A large yellowish-fulvous pilose bee, with dorsum black except last abdominal segment. Front wings black, except bases. Det., Fox.

Melecta interrupta, Cress.—La Vega de San José, N. Mex., Aug. 4. One. Continental Divide, Tenaja, N. Mex., August 2. One. Det., Fox.

Mellisodes, n. sp.—El Rito, N. Mex., August 5. One ♀. Much like *M. obliqua*, Say, ♀, but larger and more yellowish-fulvous pilose on abdomen and especially on thorax. Wings clear. Det., Fox.

Mellisodes menuacha, Cress., ♀.—Las Cruces, N. Mex. One ♀. Det., Fox.

Mellisodes montana, Cress., ♀.—Las Cruces, N. Mex., August 19. One. A species of moderate size, fulvous pilose, including basal abdomi-

nal segment, rest of abdomen black with pale yellowish pubescent bands on segments. Wings clear. Det., Fox.

Mellisodes obliqua, Say, ♀.—Las Cruces, N. Mex. One. Clypeus black. Det., Fox.

Nomia, n. sp.—La Vega de San José, Valencia County, N. Mex., August 4. One. Det., Fox.

Nototrachys texanus, Cress., ♀.—Continental Divide, Tenaja, N. Mex., August 2. One. A small, dark rufous ichneumonid. Det., Riley.

Odynerus, sp.—Las Cruces, N. Mex. A specimen caught in the act of extracting one of the mesquite tineid bag worms from its case [for description of this tineid see *Zoe*, IV., pp. 226-228]. A small black and yellow hornet. Det., Riley.

Odynerus, sp., near *annulatus*, Say.—Grand Canyon, Arizona. Hance trail, July 11. Two specimens. Det., Fox.

Osmia, n. sp.—Las Cruces, N. Mex. One ♀. A small species, with dark green abdomen. Thorax black, dark fulvous pilose above. Wings slightly smoky. Det., Fox.

Pelopaeus Servillei, St. Farg.—El Rito, N. Mex., August 5. One. Turkey Tanks, Arizona, July 18. One. Det., Fox.

Pepsis formosus, Say, ♂.—Grand Canyon, July 11. Only one specimen. This is the smaller black form with blue reflections, and with brownish-yellow wings, which are blue at base. Many have been taken at Las Cruces, N. Mex. Det., Fox.

Perdita, sp.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Philanthus, sp.—Hart Little Spring, July 14. One. A good-sized black ichneumonid with red abdomen. Det., Fox. (?) *.

Pompilus, sp. (new to U. S. Nat. Mus. Coll.)—La Vega de San José, N. Mex., August 4. One. A small purplish-black wasp. Det., Riley.

Pompilus aethiops, Cress.—La Vega de San José, N. Mex., Aug. 4. One. A wasp of a soft black colour with a faintly purplish tinge. Det., Riley.

Pompilus formosus, Say.—Las Cruces, N. Mex. Common August 21 and other dates. Four large ones measure from 4 to 4½ cm. long.

Ptenus, sp.—La Vega de San José, N. Mex., August 4. One. A sawfly. Det., Riley.

Scolia dubia, Say.—La Vega de San José, N. Mex., August 4. Two. Det., Riley.

Scolia haematodes, Burm.—La Vega de San José, N. Mex., August 4. Five specimens. This is a large black species, with apical two-thirds of abdomen yellowish-orange. Wings purplish-blue. The extra-melanic colours of the bristly pile vary from yellowish or dull orange to deep crimson. Det., Riley.

Scolia Lecontei, Cress.—La Vega de San José, N. Mex., August 4. Four. Det., Riley.

Smicra, sp.—Grand Canyon, Arizona; Hance trial. Three specimens. July 8 and 11. Det., Fox.

Sphærophthalma, sp., ♂.—Zuni River, Arizona, July 28. One. This winged specimen has the thorax and last two-thirds of abdomen yellowish or slightly orange pilose, the rest being wholly black. Det., Riley.

Sphærophthalma bexar, Blake, ♂.—Continental Divide, Tenaja, N. Mex., August 2. One. Chaves, N. Mex., August 6. One. Det., Riley.

Sphærophthalma coccineohirta, Blake, ♀.—Carrizo, Arizona, July 22. One. This mutillid differs strikingly from the forms more ordinarily met with, by having the dorsum not alone of abdomen, but also of thorax and head, with crimson-red hair. Det., Riley.

Sphærophthalma creusa, Cress.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Sphærophthalma gloriosa, Sauss., ♀.—Grant County, N. Mex. [W. J. Howard, 1882]. One specimen. This peculiar mutillid is clothed on whole dorsum with grayish-white long hair. Det., Riley.

Sphærophthalma gorgon, Blake, ♀.—Las Cruces, N. Mex. Three specimens. This is a large mutillid, all black, except dorsum of abdomen with orange-yellow hair. A larger ♀ specimen, taken in St. Joe, Arizona, July 21, has the hair of abdomen crimson-red, except base of abdomen, which with all the rest bears black hair. It is identified as same species. Det., Riley.

Sphærophthalma occidentalis, Linn., ♂.—Zuni River, Arizona, July 28. One. Continental Divide, Tenaja, N. Mex., August 2. One. Det., Riley.

Speocius speciosus, var. *grandis*, Say.—Las Cruces, N. Mex. One. Large species, colours yellow, rufous, and dark brown. Det., Riley.

Sphex, sp.—Las Cruces, N. Mex. One. A large black wasp, with orange-yellow legs and abdomen. Det., Riley.

Sphex ichneumonea, Linn.—La Vega de San José, N. Mex., Aug. 4. One. El Rito, N. Mex., August 5. One. Det., Riley.

Tachytes fulviventris, Cress.—Chaves, N. Mex., August 6. One. Sabinal, N. Mex., August 7. One. First three abdominal segments of this specimen clear, light orange, and other two segments black. Det., Fox.

Tenthredo flavomarginis, Norton.—San Francisco Mt., Arizona, July 15. One specimen. Blackish sawfly. Very nearly the same as *T. xanthus* and *occidentalis*, but without bands across the abdomen, which is wholly black. Det., Fox.

Tenthredo occidentalis, Cress.—Hart Little Spring, Arizona, July 14. Eight specimens. Like *T. xanthus*, only the abdominal bands are red instead of yellow. Det., Fox.

Tenthredo xanthus, Norton.—Hart Little Spring, Arizona, July 14. Two specimens. This is a black species with two pure yellow bands across the abdomen. Det., Fox.

Thyredon arnatipennis.—Grand Canyon, Arizona. Hance trail, up near rim, July 12. One specimen. A very large ichneumonid, with laterally compressed and petiolate abdomen. Mostly flavous. Thorax stout. Antennæ long, yellow. Wings flavous-hyaline, with entremities and posterior border black. Det., Fox.

Trypoxylon Texense, Sans.—La Vega de San José, N. Mex., Aug. 4. Three specimens. Det., Fox.

Urocerus abdominalis, Harris.—Summit of San Francisco Mountain, Arizona. Nearly 13,000 feet. Many specimens seen, three captured July 15. The abdominal segments 2 to 5 of this species are bright yellow. rest of body wholly soft black. Eyes and legs partly yellowish. Det., Fox.

Vespa occidentalis, Cress., var.—Hart Little Spring, Arizona, July 14. One collected. Many seen. A large yellow and black hornet. Det., Fox.

Xylocopa Arizonensis, Cress.—Las Cruces, N. Mex., August 19. One. Det., Fox.

NOTE.—Mention was inadvertently omitted, in the introductory remarks, of a paper on ants from Las Cruces, N. M., sent to *Entom. News* (1894) for publication, and which records twelve species.

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THE LARGER SPECIES OF ARGYNNIS, AND THE MYSTERY OF THEIR LIFE HISTORY.

BY H. H. LYMAN, M. A., MONTREAL.

Although the larger species of *Argynnis* which fly in the Eastern part of this Continent are known in all their stages, through the most valuable labours of Mr. William H. Edwards, there are certain problems in regard to their life history which have baffled the efforts of all the entomologists who have attempted to solve them.

On page 124, of Vol. VI. of CAN. ENT., Mr. Edwards wrote as follows :—

"There are one or two points in the life history of the larger *Argynnides* that are not yet clear. With us, *Cybele* male is on the wing from the 25th of May to the 10th of June, as I have noticed for several successive years. Probably *Aphrodite* nearly as soon, and *Diana* first appears about the 20th of June. Shortly after the 1st of June the female of *Cybele* is to be seen, and both sexes abound in the clover fields. By the end of June *Cybele* has become scarce, and the individuals to be seen have lost their freshness and are broken and worn. It is certain that these early appearing females have not matured eggs and laid them, because at no time from June to August will anything but rudimentary eggs be found by dissecting, and the eggs do not become distinguishable to the eye until August. They then mature rapidly, and in a few days attain full size. I am confident that no eggs are laid till August. But about the first of that month, and all along to near the end of it, there appear in great numbers both fresh males and females, as if just from chrysalis, with no abrasion of the hairs on thorax between the wings, which spot is the first to show wear. (I doubt if an *Argynnis* could fly two days without thus giving evidence of it.) There are flying at the same time many worn individuals, especially females. These last are the first to deposit their eggs, but shortly after, and up to the time of frosts, the others also are in condition to do the same. I see no other explanation of the appearance of these freshly emerged butterflies than that they have formed part of the brood of caterpillars hatched the previous fall, some of which brood yielded the butterflies that came out in May and June, and the remainder continued in the larval or chrysalis state until August, and upon these last the perpetuation of the species largely depends, for nine-tenths of the June flight must have been destroyed long before August. If I am right the preparatory stages of the August *Cybele* must consume eleven months out of the twelve."

On page 73, of Vol. XII., CAN. ENT., Mr. Edwards referred to the above extract and then continued as follows :—

"I now am of the opinion that there are two annual broods. The experience in fall of 1878, with those larvæ of *Alcestis* which proceeded to feed instead of going into lethargy, and passed two and three moults within a very much shorter period than has been observed in the spring, showed that six weeks in midsummer might not improbably be long enough for all the changes. Perhaps also there are but four larval moults in the summer brood, as in some of the *Melitæas*, though there are five in the winter brood. Every stage would be shortened by the hot weather of July. On 14th June, 1878, I saw a pair of *Cybele* flying in copulation. In all instances where this has happened with butterflies under my observation, and the females have been secured (and this includes *Arg. Atlantis* and *Myrina*), eggs have been laid within a few hours after. Eggs laid 15th June would allow about two months for the several stages to imago."

In Mr. Scudder's *Butterflies of New England*, on page 549, after quoting in full the first of the above extracts, the author proceeds :—

"No such interrupted series of emergences has been detected in the history of our three species in New England, but if, as is probable, this is a first step towards true digoneutism, it might well be looked for in Southern New England, and should especially be sought for in *A. Cybele*."

Mr. Scudder proceeds to say that in the North there is a prolonged but uninterrupted emergence of fresh material from the chrysalis and suggests that the phenomena may be attributed to lethargy in the caterpillar, periodic and fixed in the South, casual and irregular in the North.

The life history is given by Mr. Scudder as follows :—

"The insect is single brooded in New England, passing the winter in the larval state. The caterpillars become full grown in June, and the earliest butterflies appear in the latter part of June, sometimes as early as the 16th in the latitude of Boston, usually not much before the 21st; become common by the 1st of July, when the female first emerges; continue to escape from the chrysalis until at least the middle of July, and fly until the middle of September and occasionally later. The butterflies generally pair at the end of July, but the eggs do not begin to assume their proper size until about the middle of August, and are not laid until the last of August or first of September. Miss Soule obtained eggs in Stow, Vt., on August 20, which is the earliest New England date known to me."

"The eggs hatch in about fifteen days, but the caterpillars from them go immediately into hibernation without eating anything more than their egg shells."

From 1868 to 1875, inclusive, I spent the summers, from about the 15th July to the first week in September, on Cape Elizabeth, near Portland, Me., and I observed the phenomena of the second emergence described by Mr. Edwards. When I first arrived the *Argynnydes* were flying, but in a worn and dilapidated condition, but about the 1st of August fresh examples appeared and I observed them in copulation with some of the worn ones, but later only those of the second flight were seen in coitu.

On 1st July, 1891, when on a Dominion Day excursion to Vaudreuil, Q., I observed a pair of *A. Cybele* in copulation, resting on a bush within a yard of where I was standing. Oblivious for the time of the interest and importance of the fact, I did not secure them, and so lost the opportunity of trying to obtain eggs at that time.

On 2nd July, 1894, I went out to St. Therese to look for females of *Cybele*, but though plenty of males were on the wing, no female was seen.

On 14th July I went up the mountain for the same purpose and was fortunate enough to secure one in fair condition. This I immediately confined over a violet planted in a pot, by a wire gauze cylinder, but fearing that the eggs might possibly be laid upon the wire gauze, I substituted a net cage on the 15th. This cage was kept out of doors on a back gallery, but on the 18th was upset and demoralized by a too inquisitive feline anxious to find out what sort of a bird was kept in such an insecure cage.

On my return home in the evening I proceeded to examine the wreck, though I supposed the butterfly had escaped, but on carefully stirring the spilled earth the poor thing struggled out of its grave and was carefully secured, and on examination was found to be sound, though with sadly damaged plumage.

Two days later I carried it out in a box to Paul Smith's, in the Adirondacks, whither I went to look for *Colias Interior*, and rigged up a fresh cage for it by planting a violet in a tomato can. I cannot be sure when the first eggs of *Cybele* were laid, but the two first found were observed on 30th July, which is three weeks earlier than any previous record for anywhere near this latitude, according to Mr. Scudder, but, curiously enough, is the same date as recorded by Wm. Buckler for *Argynnis Paphia* in the first volume of "Larvæ of British Butterflies and Moths," as noted by Mr. Scudder.

This female lived for 29 or 30 days in confinement, and laid eggs at various times up to about 12th August. Comparatively few eggs were laid and most of them hatched in due course, the first on 18th August, giving an egg period in hot summer weather of not less than 19 days and probably longer. This larva behaved in a very curious manner and was a subject of much interest. It was placed on a violet planted in a small pot and left out over night without any cage and in the morning it could not be seen and I feared it had escaped, but placed a small wire gauze cylinder over the plant.

On the 20th it was carried with the rest of my menagerie on a holiday trip to Murray Bay, Q., and on 23rd was found crawling about on the plant and it looked larger than when placed upon it.

On 25th, I observed it feeding on one of the young, unexpanded leaves near the roots, in the morning and also at lunch time, but by evening it had disappeared from view.

On 26th, observed larva in the evening resting near the roots.

On 27th, found in same place in the morning; at 1:40 p. m. it was half way up the stem of one of the leaves, and at 3:10 p. m. in the same position.

On 28th, in morning, it was in same position; later it was seen crawling about the lower curved stems; by evening it had disappeared.

On 29th, still in hiding; later discovered it resting on a leaf-stalk near leaf.

On 30th, in same position on leaf-stalk, but found that a little had been eaten out of each side of the approximate edges of the leaf; the eating on each side made the injury to the leaf extremely inconspicuous. At 1:15 p. m., found it on this leaf for first time, later it disappeared.

On 31st, still in hiding.

On 1st September, found larva had left plant, which had been left uncovered since 23rd, and was on the shelf; replaced it on the plant and put wire gauze over it. Found remains of an egg shell on the plant.

On 2nd September, larva on leaf, then on stem of another leaf; later had disappeared.

On 4th, I left for Quebec by the day boat and placed my paraphernalia in what I thought was a safe place in the saloon, but some one knocked the wire gauze cover partly off the pot and this larva apparently escaped, for I never found it again. It had lived and fed sparingly for seventeen days, and had grown slowly but perceptibly, although it had not passed a moult.

Three more eggs hatched on 5th Sept. and another on 6th, but though I found, on the 7th, a leaf a little eaten, the larvæ did not seem inclined to feed, but seemed to rest most of the time in a lethargic condition.

These eggs which hatched last must have been laid not later than 11th or 12th of August at the latest, which would make the egg stage not less than about 24 or 25 days, but the climate at Murray Bay would doubtless

retard their development somewhat. At least one egg did not hatch, though the larva seemed to be fully developed inside it. As soon as I found that these larvæ would not feed and that they seemed to be shrinking in size, I put them into a small pill box and the unhatched egg in another and placed them along with a pill box containing larvæ of *Colias Interior*, in a wide mouthed glass jar, with a bung to close the mouth, and put it in the refrigerator. Some time afterwards I found that by some means water had got into the jar and the boxes were wet and mouldy, and so took them out. The larvæ were still alive, so I placed them out of doors, and later, when the snow came, I put them in a box and buried them under the snow. The *Colias* larvæ survived the winter, but these did not.

On the 10th of June last I went out in the evening to St. Therese on an entomological quest, and the next day I found *Cybele* ♂ on the wing. Messrs. Winn and Gibb have also found it as early, and I think that this early appearance in this latitude proves that these early fliers could not have come from larvæ which hibernated direct from the egg, but that the larvæ must have passed one or more moults before hibernation. Mr. Edwards found the pupal period to be 22 to 24 days, in Virginia, in some cases and from 16 to 20 days in others. Now, it is probable that in this latitude the period would be as long as the longest in Virginia, but even the shortest would carry back pupation into the month of May, and as the snow often lies till late in April and the early part of May is frequently cold, it would only leave four or five weeks of cool weather for the full growth of this larva, which is said to be decidedly sluggish in its growth, which seems to me utterly impossible. *Colias Interior*, which passes one moult before hibernation, develops rapidly, and has a pupal period of only about ten days; does not attain the imago state in the Adirondacks for several weeks later, though the ones reared by me in confinement had their period of emergence accelerated by about three weeks.

My experiments so far have produced rather negative results, but they prove that eggs are laid in July, that the resulting larvæ sometimes feed and grow perceptibly, and, I think also, that the species flies too early in this latitude to have come from larvæ which hibernated direct from the egg.

I do not like theorizing upon such insufficient data, but I am inclined to the hypothesis that there are two almost distinct cycles of this species

which overlap somewhat, some of those of the earlier cycle living until after the appearance of those of the later one, and in some instances mating with them.

Upon this hypothesis the larvæ which hibernated direct from the egg would all start feeding at about the same time and so would account for a simultaneous appearance of many fresh specimens about the beginning of August, while those which emerge over a considerable time in the early summer would be from those larvæ which had passed one or two moults the previous year.

Mr. Edwards's later view, that there are probably two broods in Virginia, the one descended from the other, I hold to be untenable in view of the long egg period, even in the heat of early August. Nor am I inclined to accept as probable the suggestion of Mr. Scudder, based upon the experience of Vaudouer in the case of the European *Euphrosyne*, of a lethargic period in the case of that portion of the brood which does not reach the imago state till August.

I hope to pursue my experiments further, and to that end appeal for the assistance of other lepidopterists, and will gladly pay, either in money or exchange, for living specimens of the female of this species sent me not later than the first week in July. These can be sent by mail in suitable boxes addressed to me at 384 St. Paul St., Montreal.

TRYCHOSIS TUNICULA-RUBRA, N. S.

RÉV. THOMAS W. FYLES, SOUTH QUEBEC.

While studying the habits of *Gelechia gallæ-diplopappi*, I have repeatedly met with a parasite, in the galls of the moth, that I have not found elsewhere.

I have submitted imagos of the species to several of our most eminent hymenopterists, and all agree that the species is new to science and undescribed. To Mr. Ashmead I am indebted for the information that it will properly come into Förster's genus *Trychosis*.

The full-grown larva of the species is a fusiform, legless grub, three-tenths of an inch long, and having thirteen segments, counting the head. The anal segment is somewhat elongated. The creature is of a white waxy appearance, with a tinge of pink; and it has a few short hairs on its face and along the back and sides. The spiracles are well defined. On the ventral surface of the grub are a number of extensile and retractile pads or pseudopodia, by the aid of which it fastens itself to its victim, or

moves about within the hollow gall. Its mouth is large and set well up in the face, and the upper lip has a beak-like curve.

On the 10th of July, 1891, I witnessed the cleaning out of a chrysalis case of *G. gallæ-diplopappi* by a grub of this species. The creature, having finished its meal, left the case and immediately proceeded to spin its cocoon. When completed, this cocoon was long and sack-like, but compact in texture. It was white at first, but it darkened with age. The perfect insect burst from it on the 10th of June of the following year.

On another occasion, on opening a gall, I found a grub of the species just finishing a dessert of the very case of its victim. In this instance the grub, in a short time, voided the indigestible parts of its meal in dark pellets, and then commenced to spin.

I opened a cocoon of the parasite on the 25th of March last, with a view to describing the pupa. I found that the pupal change had not taken place. Preparations for it, however, seemed to be commencing. The head was becoming rounded; the mouth was sealed up, but its outline was still apparent; the pseudopodia were disappearing; the body was becoming attenuated.

I put the creature back into its ruptured envelope, but it was not content to remain in it—it wriggled out, so I placed it in a clean paper box, and, I am glad to say, its changes went on as if nothing unusual had happened.

By the 1st of April the head, thorax and abdomen of the insect could be traced under the skin. The first two had become yellowish, and the eyes, which I had first noticed as faint streaks, now showed as brownish oblong patches.

In the night of April 1-2 the pupal change took place. In the morning I found the shrivelled larva skin still clinging to the extremity of the body. The main parts were now of distinct form, and the antennæ and limbs appeared in proper shape, extended beneath the insect, and beautifully white and pellucid. The only colouring was in the eyes, which were large and brown.

On April 6th I found that the ocelli were distinctly seen, and that the upper part of the abdomen was beginning to darken.

On the 8th the thorax began to turn black. On this date I made a drawing of the pupa. The insect seemed to object to the strong light in which I had placed it. I noticed twitchings of the legs and antennæ. I therefore put it back in its box as soon as possible.

On the 9th I found that the head and thorax were quite black, while the legs and antennæ were still pellucid.

On the 11th the red of the three first segments of the abdomen on the upper side and the black of the remaining segments on the upper side were seen. The upper portions of the legs also and the bases of the antennæ were taking colour.

On the 13th the insect was fully coloured, with the exception of a white streak on either side of the abdomen. The legs had begun to spread themselves.

In the night of the 13th the wings burst from their cases, and before the close of the day following the insect had risen upon its feet.

No doubt the warmth of my house, and the rupturing of the cocoon, hastened the changes of the insect. I should say the usual time of the creature's appearance in the perfect state is the middle of June. The galls formed by the Gelechian begin to show themselves in the first week of June, and there is only one brood of *G. gallæ-diplopappi* in the year.*

Descriptions of the imago, male and female, of *T. tunicula-rubra*:—

♀.—Expanse of wings, one-half inch; length of body, one-quarter inch; length of antenna, two-tenths inch; length of ovipositor, one-tenth inch.

HEAD black, punctured, and set with whitish hairs; face convex; clypeus somewhat nasiform, hairy; compound eyes of a rich madder-brown; ocelli black and prominent; palpi long, five-jointed, flavescent; antennæ filiform, basal joint oblong-ovate, black and hairy. In the flagellum, which is brown, are thirty-one joints, of which the first, counting from the ring-joint, is four times longer than thick.

THORAX black, shining, deeply punctured; mesothorax and scutellum convex; legs long and slender, the coxæ black, trochanters and femora fuliginous, tibiæ and tarsi ferruginous; wings iridescent, slightly hairy; costal and externo-medial nervures hairy; stigma large and brown; areolet rather large, pentagonal; cubito-discoidal cell large; the third discoidal cell and the first apical cell of moderate size; the second apical cell large; the basal nervures slightly and regularly curved.

ABDOMEN fusiform; petiole rather long and slender, recurved, jet black; the three first abdominal segments deep red, the remainder black; ovipositor ferruginous, straight, stiff and pointed—its case fuscous, blunt and hairy.

♂.—General appearance darker and less robust than that of the female. Antennæ dark brown, nearly black, twenty-six joints in the flagellum, the first being five times as long as thick; eyes prominent, brown; ocelli black; palpi five-jointed, brown; coxæ black, hairy and punctured—the hindmost pair unusually large; first pair of legs ferruginous; the rest fuliginous, with knees of lighter colour; tibial spurs stout; wings smoky; abdomen long and slender; petiole black, extended, horn-shaped; three following segments red, the first and third edged with black; the rest of the abdomen black.

* Wherever I have found *T. tunicula-rubra* I have found the skin over the opening of the gall ruptured, I suppose by the ovipositor of the mother Trychosis.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XVI. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC—(*Continued*).

TRIBE IV.—CLYTHRINI.

The species included here are of rather short, cylindrical form, sometimes suggesting in shape the *Cryptocephalini*, though easily separated, so far as our genera are concerned, by the shorter and stouter antennæ. Most of them are Southern or Western in distribution, and the few genera recorded from within our limits may be known among themselves by these characters:—

A. Front coxæ contiguous.

Large; colour, in our species, chiefly yellowish or testaceous;
tarsal claws simple.....*Anomæa*.

Small; colour in our species bluish, with four yellowish or reddish
elytral spots*Babia*.

AA. Front coxæ separated by the prosternum.

Large; eyes transverse, emarginate.....*Megalostomis*.

Small; eyes oval, not emarginate.....*Coscinoptera*.

It seems certain that *Megalostomis* cannot be retained as a member of the Canadian fauna, as the species included therein have never been found farther north than Kansas.

ANOMÆA, Lac.

Represented by *Anomæa laticlavata*, Forst., found occasionally on the rag-weed (*Ambrosia*). It is apparently, however, quite a general feeder, having been taken also on various legumes, and on oak, cotton, and willow. In colour it is fulvous, elytra a little lighter, their sutural and outer margins narrowly bordered with black; under side of body, excepting the prothorax, dark, but densely covered with light pubescence. Legs yellow, often with tibiæ and tarsi more or less blackish. The male has more deeply serrate antennæ and longer anterior tibiæ than the female. Length, .28-.32 in. Form cylindrical.

COSCINOPTERA, Lac.

C. dominicana, Fabr.—Black; of robust form, much less elongate than *Anomæa*. The upper surface is sparingly covered with a light-coloured pubescence, the under side much more densely so. Thorax densely, not very coarsely, punctured and with median smooth line.

Elytra more coarsely but less densely punctured. Length, .20-.22 in. The only Canadian specimen I have seen was sent me from Toronto by Mr. R. J. Crew. Fig. 13 [after Riley] represents this insect in all its stages: *a*, the larva extracted from its case; *b*, larva dragging its case, which is composed of chewed fragments of leaves; *c*, beetle, enlarged to show punctures; *d*, beetle, natural size; *e*, egg, highly magnified; *f*, head of larva, under side; *g*, head of male beetle; *h*, jaw of same; *i*, eggs, natural size, showing mode of attachment to leaves; *j*, leg of larva; *k*, jaw of same; *l*, maxilla of same.



Fig. 13.

MEGALOSTOMIS, Chevr.

A record of *M. subfasciata*, Lec., occurs in the supplement to the Label List of Coleoptera for 1889. It is a rather large insect (.24-.30 in.), nearly black, with cinereous pubescence. The elytra each have a large basal red spot reaching from the immediate vicinity of the outer margin to the neighbourhood of the suture. The size and coloration will separate it from any of the known Northern Clythrini. The recognized range is from Arizona to Kansas.

BABIA, Chevr.

A pretty, shining black insect of somewhat oblong form, shining surface, the elytra with a humeral and subapical red spot on each, the anterior the larger. The striae are coarsely punctate. Antennae short, the last character serving to separate it easily from some of the black and red Cryptocephali with which beginners occasionally mix it. The species is *B. quadriguttata*, Oliv. Length, .14-.16 in.

TRIBE V.—CHLAMYDINI.

These curious little insects can be mistaken for nothing else. They are of very short, compact form, the upper surface of the body covered with large tubercles; in colour they range from dull brown to black or bronze. The legs are contractile, the antennae short. As has often been remarked, they resemble the excrements of caterpillars, and so closely as

to render their detection, even when swept into the net, a matter of some uncertainty. The two genera are thus distinguished:—

Antennæ serrate from the sixth joint.....*Exema*.

Antennal serrations beginning before the sixth joint.....*Chlamys*.

EXEMA, Lac.

A small black, rough beetle, about .10 in. long, often variegated with very small yellow spots or even with the head and prothorax almost entirely yellow. The legs are usually more or less yellow, the antennæ entirely so. The Canadian *E. dispar*, Lac., is considered a variety of *E. conspersa*, Mann.

CHLAMYS, Knoch.

Represented by *C. plicata*, Fabr., a larger insect than the preceding, and of shorter, more robust form. The tuberosities of the upper surface are very pronounced, the colour more or less metallic brown or black, legs black. The variety *polycocca* is that in which the tubercles are more distinctly separated and not aggregated into the form of ridges as in typical *plicata*. Length, .16 in. Fig. 14 represents the larva (*a*) and its curious sack.

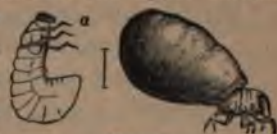


FIG. 14.

TRIBE VI.—CRYPTOCEPHALINI.

Form robust, more or less cylindrical, and sometimes even approaching globularity. Elytra rather short, leaving the tip of the abdomen exposed, not tuberculate, striato-punctate. Antennæ usually long and slender. Colours usually arranged in a variegated pattern, taking on various combinations of spots or stripes, which are sometimes very inconstant; occasionally a species is found which is unicolorous. The genera are thus separated in the "Classification":—

A. Claws appendiculate (*i. e.*, with a square dilatation at base; small species).

Form robust, rounded.....*Monachus*.

Form more elongate, cylindrical.....*Diachus*.

AA. Claws simple (mostly larger species).

b. Prothorax not margined at base, crenulate.

Frontedge of prothoracic flanks sinuous or toothed. *Bassaricus*.

Front edge of prothoracic flanks straight... *Cryptocephalus*.

bb. Prothorax margined at base, not crenulate; prosternum feebly channelled.....*Pachybrachys*.

MONACHUS, Chevr.

Two very robust species of blue colour belong here; they may be obtained by sweeping meadows. Dr. Leconte separates them thus:—

Form oval; prothorax smooth, opaque, rows of elytral punctures feeble...*ater*, Hald.

Form ovate; prothorax with punctures near the base, rows of elytral punctures strong...*saponatus*, Fabr.

Both are of about the same size (.10-.12 in.) and have rather elongate antennæ, which are testaceous at base.

DIACHUS, Lec.

Contains the smallest Canadian *Cryptocephalini*. They are of cylindrical-oval form, and somewhat metallic colours, overlaid on blue or green. The two recorded from within our limits are:—

Elytral striæ obliterated behind the middle; sides of prothorax, antennæ and legs testaceous; .06-.08 in.....*auratus*, Fabr.

Outer elytral striæ impressed, curving around at tip; prothorax smooth; colour, dark blue-green, antennæ and legs reddish-brown; .08-.11 in.....*catarius*, Suffr.

BASSAREUS, Hald.

The two species look much like *Cryptocephalus*, but may be distinguished by the character given in the table. *B. detritus* measures from .18-.22 in., and is of a blackish colour, the elytra with four red spots; the prothorax is opaque, sparsely punctured. The other species, *B. mammifer*, has a smooth, shining prothorax, and varies from .14-.22 in. in length. The typical form has elytra spotted like those of *detritus*; *i. e.*, a large anterior spot on each wing-cover and an apical one. It runs, however, through the following varieties, which have received separate names: *sellatus*, Suffr., in which the anterior elytral spot is reduced in size and the sides of the prothorax are white; *pretiosus*, Melsh., with a larger anterior elytral spot, which is connected with some small basal spots, the prothorax with sides and two spots at base white; and *luteipennis*, Melsh., with yellow elytra.

CRYPTOCEPHALUS, Geoffr.

A number of species occur in Canada, some of which will be found mixed, in the collections of beginners, with *Babia 4-guttata* and the species of *Bassareus*. They are, however, readily separated when once attention has been called to the characters in use for the purpose. The

following table will, it is thought, serve for the separation of the Canadian forms among themselves without reference to prosternal characters, for an exposition of which the student is referred to Dr. Leconte's paper on the genus in Trans. Amer. Ento. Soc. for 1886.

- A. Elytra yellow with two oblique black stripes ;
prothorax reddish, usually with two basal
oblique yellow spots. .17-.21 in. (Fig.
15)..... *Venustus*, Fabr.

AA. Elytra spotted.

- b^a. Spots numerous, arranged 2, 2, 2, 1 on each
elytron, yellowish on brown or black
ground. Prothorax reddish. .16-.22
in..... *guttulatus*, Oliv.



FIG. 15.

- b^b. Spots at base confluent into a transverse band which extends to
the sixth stria, a marginal spot just before the middle extending
to fifth stria, an interrupted post-median band and apical
spot, all yellow. Ground colour of elytra brown. Pro-
thorax brown. .12-.16 in..... *badius*, Suffr.

- b^c. Spots very different in size, the middle ones usually confluent
into a large blotch on the sutural region, the others usually
quite small and arranged in longitudinal rows; they are
brown or black on a pale yellow ground. The prothorax is
ferruginous or nearly black; sides and front, and often also
two oblique basal spots, yellow. .16-.28 in. *mutabilis*, Melsh.

- b^d. Spots red, not exceeding two on each elytron; ground colour
black or blue-black, prothorax black.

- c. Humeral spots confluent on median line so as to form a band
extending quite across (var. of next species). *notatus*, Fabr.

cc. Humeral spots separate.

Larger and more robust; humeral spot large, extending
along sides, apical spot variable in size. .14-.22
in..... *quadrinotatus*, Say.

Smaller and more slender; humeral spot oblong, slightly
wider behind, hardly reaching the base. Apical spot
rounded. (The var. *4-guttulus* differs only in having
the humeral spot longer, reaching to the middle of the
length of the elytra.) .10-.12 in. *quadruplex*, Newm.

AAA. Elytra plain. Colour testaceous or slightly brownish; prothorax densely rugosely punctured. .12-.16 in. *Schreibersi*, Suffr.

It should be remarked that nearly all of these are very variable in colour, but the table covers all of the recorded named varieties for East Canada. Any specimens which appear not to come under any of the names given should be referred to specialists.

PACHYBRACHYS, Chev.

Contains a number of small species in which the outer striae of the elytra are usually completely confused and the inner ones tortuous and irregular. They have been tabulated by Dr. Leconte, in the paper cited, and in this as well as the preceding table we have drawn upon his work for many characters.

A. Colours of upper surface definitely arranged.

b¹. Striped yellow and black or brown.



FIG. 16.

Suture broadly black, each elytron with two broad stripes and narrow margin black. Thorax with M-like brown mark. .10-.14 in. *litigiosus*, Suffr.

Suture very narrowly black, each elytron with a broad oblique stripe, narrow outer margin and an intervening row of spots black. Thorax either entirely yellow, ferruginous, or yellow with ferruginous, M-like mark. .14-.22 in.

(Fig. 16). *viduatus*, Fabr.

b². Opaque black, prothorax with sides, front margin, anterior portion of median line and two basal spots, red. This red may be variously reduced. .16-.20 in. *trinotatus*, Melsh.

b³. Yellow above, head with black spot on crown, prothorax with a black spot on each side, and a somewhat Y-shaped one at middle. Elytra with humeral spot and a large V on suture, which joins at its apex with an irregularly indented transverse subapical band, black or brown. These markings may become indistinct at times. .06-.12 in. *tridens*, Melsh.

AA. Uniform opaque black. .10-.14 in. *carbonarius*, Hald.

AAA. Colours more or less mottled.

c. Sides of prothorax strongly rounded and incurved near base; hind angles rounded.

Black, mostly opaque, upper surface mottled with small white dots; prothorax sometimes red at sides, femora often with a yellow spot. Elytra confusedly coarsely punctured over most of the surface. .13-

.16 in.....*luridus*, Fabr.

Black, opaque, elytra with fewer confused punctures, white spots more numerous; pygidium with testaceous spots, legs testaceous in great part.

.10 in.....*femoratus*, Oliv.

cc. Sides of prothorax obliquely broadly rounded or straight, not incurved behind.

Punctures of prothorax and elytra uniform, two striae visible at sides; upper surface dull ochreous clouded with brown. .08-.12 in.....*hepaticus*, Melsh.

Punctures of elytra more or less irregular, striae visible at sides and behind. Black, opaque, prothorax with sides and dorsal spots red, elytra with a broad irregular band from the side almost to the suture.

.11-.14 in.....*subfasciatus*, Hald.

The above scheme includes all of the species known from East Canada which are included in Dr. Leconte's table, which has been followed for the most part. Three recorded forms, *atomarius*, *infaustus*, and *sobrinus*, are left unaccounted for; they belong to a group of small species, mostly mottled, in which the prothorax is formed as in the division cc, the elytral sculpture consisting usually of an irregular punctation, with the striae visible chiefly at sides and behind. The prosternum is broad and only very slightly concave, which character will separate them from the species preceding *hepaticus*, since the prosternum in all those is sulcate. A careful study is required, with reference to the types, before anything further should be attempted.

We have much pleasure in recording that the Honorary Degree of LL.D. was conferred upon two members of the Entomological Society of Ontario—Professor WILLIAM SAUNDERS, F. R. S. C., F. L. S., F. C. S., Director of the Experimental Farms of the Dominion, and Mr. JAMES FLETCHER, F. R. S. C., F. L. S., Dominion Entomologist and Botanist,—at the recent convocation of Queen's University, Kingston, Ontario. We beg to offer our esteemed friends our very hearty congratulations upon this well-deserved honour.

FIVE NEW BEES OF THE GENUS CALLIOPSIS, FROM NEW MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Calliopsis meliloti, n. sp., ♀.—Length, 5 mm.; head and thorax wholly black, abdomen very dark brown, with yellowish-white markings. Head, thorax, legs, and sides of abdomen with abundant long dull white hair. Clypeus prominent, shining, with conspicuous sparse punctures, its upper portion longitudinally sulcate in the middle, its whole surface appearing bare, with only very short, inconspicuous hairs. On each side of the clypeus is a shining bare eminence. Vertex closely punctured. Mandibles brown. Antennæ quite short, the hairy scape not much less than half as long as the flagellum, the last joint of which is truncate and somewhat flattened.

Tegulae shining testaceous. Dorsum of metathorax bare, smooth. Legs dark, knees and terminal joints of tarsi becoming paler. Wings quite short, hyaline, iridescent, nervures and stigma light reddish-brown. Second submarginal cell about three-fourths length of 1st; narrowed one-half to marginal. Abdomen short and broad, with broad creamy-white bands; that on first segment narrowly interrupted in middle, and roundly notched on each side behind; that on second very broadly interrupted, and also notched at sides; those on third and fourth entire, notched at sides behind; finally an obscure broad subrufescent band partly on fourth and partly on fifth segment. Anal fimbria dirty white.

Habitat.—Las Cruces, N. M., on the College Farm, May 1st, 1895; swept from *Melilotus indica*, together with *Nomada*, *Sphecodes*, *Prosapis*, and four species of *Halictus*, viz.: *bardus*, *stultus*, *pectoraloides*, and *meliloti*.

It is related to *C. cinctus*, Cr., but differs in the abdominal bands being white instead of yellow. The anal fimbria not fuscous, the wings not at all dusky. It has some superficial resemblance to *Perdita albovitata*.

Calliopsis hirsutifrons, n. sp., ♂.—Length about 6 mm.; pitch-black, very shiny, thorax and abdomen without any pale markings, face-markings creamy-white. Face, including clypeus, scape, cheeks, occiput, sides of thorax, post-scutellum, metathorax except basal middle, legs, and lateral hind margins of abdominal segments, with rather dense and fairly long white pubescence. Head transversely oval, ocelli small and close together, vertex with no distinct punctures; clypeus except the usual

dots, and triangular lateral face-marks, white, the latter in shape not very far from a half-circle, but the ends more produced and the inner (orbital) margin a little concave. Mandibles mostly white without. Flagellum black above, coffee-brown beneath.

Disc of mesothorax with conspicuous, very sparse punctures; at sides of mesothorax, and on scutellum, they are much closer. Tegulae dark chestnut-brown. Legs black, anterior tibiae in front, and first joint of all the tarsi, cream colour; remaining joints of tarsi subrufescent. Claws deeply cleft. Wings hyaline, with a faint smoky tinge, which does not extend to the external margin; nervures and stigma dark brown, marginal cell long, the tip roundly truncate, minutely appendiculate. Second submarginal a little shorter than 1st, narrowed a little less than one-half to marginal. Abdomen narrow, strongly but rather sparsely punctured, the segments transversely grooved adjacent to the sutures. Hind lateral margins of segments with white hair bands.

Habitat.—Albuquerque, N. M., middle of August, 1895 [Ckll., 4527]. Something like *C. pauper*, but hairy, and the tibiae are differently marked. It resembles a good deal the ♂ of *C. albitarsis*, which I took on *Rudbeckia laciniata*, at Santa Fé, N. M., July 19th. In *albitarsis*, however, the face is not nearly so hairy, the face-marks are pale yellow, and the lateral marks are obtuse instead of pointed above.

Calliopsis fraterculus, n. sp., ♂.—Length about $6\frac{1}{2}$ mm., pitch-black, with the clypeus, triangular marks at sides of face, and tibiae in part, pale lemon-yellow, tarsi light. Head broader than long, shining, the ocelli in pits, a conspicuous prominence adjacent to the summit of each eye, occiput and cheeks with large, more or less confluent, punctures. Vertex with very few punctures, front with large subconfluent punctures; clypeus punctured, high, light yellow, with its piceous apical margin produced into a tooth on each side; lateral face-marks triangular, rounded above, not extending as high as antennal sockets; labrum truncate, mandibles wholly dark; antennae short, reaching about to tegulae, flagellum dark brown. Thorax wholly dark, with large punctures; pubescence of head and thorax sparse and inconspicuous, white, specially noticeable only on each side of antennae, on border of prothorax, beneath the wings, and at the sides of the metathorax. Punctures of scutellum and post-scutellum very large and like those of mesothorax, those of metathorax smaller and closer. Base of metathorax with obscure longitudinal wrinkles, but no well-defined smooth space behind them. Tegulae shining dark reddish-

brown. Wings fuliginous, nervures and stigma piceous, a pale dot at base of stigma. A small hyaline spot at angle between marginal and second submarginal cell, and one just beyond upper corner of third discoidal. Venation practically as in *æthiops*, but the marginal cell not so narrow in proportion to its length. Legs black, knees and external bases (half, more or less) of tibiæ pale yellow, tarsi pale yellow, the terminal joints becoming brown. Claws only slightly bifid. Abdomen densely punctured, the apical margins of the segments smooth and constricted. ♀.—Length about 7 mm., more robust, abdomen broader, segments not constricted, punctuation in general finer, legs with dirty white hairs, dense on hind pair. Legs dark, with a light yellow spot at extreme base of each of the anterior and middle tibiæ. Face wholly dark.

Habitat.—New Mexico; the ♀ on *Bigelovia Wrightii*, at Las Cruces, Sept. 23rd, 1895; the ♂ at Albuquerque, middle of August, 1895.

This species is a sort of small brother of *C. æthiops* (Cr.), from which it is easily distinguished not only by its size, but by the sculpturing of the metathorax. *C. æthiops*, also, does not have the shining boss at the summit of the eyes, which is present in both sexes of *fraterculus*. I have taken *C. æthiops* at Las Cruces, N.M., Sept. 21, 1895, on *Helianthus annuus*.

Calliopsis perlavis, n. sp., ♀.—Length, 8 mm., black, shining; face and thorax without pale markings. Head subquadrate, not particularly large, a little longer than broad; clypeus rather prominent, produced into a tooth on each side; mandibles dark reddish at ends; face, clypeus, front, vertex and cheeks strongly punctured, the punctures smallest and most dense on front and beneath antennæ; antennæ reaching as far as base of wings, joints 6 to 10 of flagellum testaceous beneath. Mesothorax shining, with small shallow punctures, fairly dense in front and at sides, but becoming sparse towards the middle, and almost lacking in the middle. Scutellum with sparse punctures, base of metathorax longitudinally wrinkled. Pubescence of head and thorax sparse, very pale brownish, most noticeable on cheeks, occiput and pleura; only a few scattered hairs on sides of metathorax. Tegulæ amber colour. Wings subhyaline, grayish, yellowish towards the base, costal nervure and stigma dark brown. The outermost nervures also dark brown, but the rest amber colour. Second submarginal a little shorter than first, narrowed about half to marginal. Legs dark, a rather ill-defined small yellow spot at base of each of the four anterior tibiæ, tarsi becoming rufescent. Hind legs with a copious clothing of hair. Abdomen shining, parallel-sided, the apical

margins of segments 2 and 3 becoming rufescent. Punctures of dorsum minute and close, on first segment extremely sparse and small.

Habitat.—Las Cruces, New Mexico; two on sunflowers, October 6th, 1895. By its smooth surface it comes nearest to *C. margaritensis*, Fox, but that is a smaller insect.

Calliopsis Boylei, n. sp., ♂.—Length a little over 7 mm., very slender, black with yellow markings. Head somewhat broader than long; antennæ very long, entirely black; face flattened, the clypeus not projecting; entirely bright lemon-yellow nearly up to the level of the antennæ, the upper edge of the yellow straight right across the face, the yellow projecting above this only for a short distance, very narrowly, on orbital margins. The supraclypeal yellow area is about square. The labrum is also yellow, as well as part of the mandibles without. There is an impressed line down the middle of the clypeus, failing anteriorly. Face with large scattered punctures, almost lacking on supraclypeal area and close to the impressed line of clypeus; front, vertex and cheeks closely punctured. Pubescence of head and thorax sparse, tinged yellowish; anterior sides of clypeus with long white, very distinctly plumose hairs. Mesothorax shining, with distinct, rather close punctures, parapsidal grooves distinct. Scutellum with large, not very close, punctures. Base of metathorax transversely wrinkled, the area behind this not smooth, but minutely roughened. Sides of metathorax fringed with hairs. Tubercles with a chrome-yellow spot, tegulæ shining testaceous. Wings yellowish-hyaline, nervures and stigma dark chestnut-brown, costal nervures black, marginal cell unusually long, 2nd submarginal narrowed one-half to marginal. Legs black, with the knees, the anterior tibiæ in front, a spot at base and apex of middle tibiæ, nearly the basal third and the apical eighth of hind tibiæ, pale orange. Tarsi pale orange, the terminal joints darkened. Claws long and curved, only cleft at extreme tips. The hind legs are very long; the middle tibiæ are very short, hardly half as long as the hind tibiæ. Abdomen long and slender, black, the bases of the segments after the first with a fine light pile, very noticeable when the insect is held sideways. Dorsal surface of abdomen, except the broad impressed apical margins of the segments, finely and closely punctured, the punctures extremely small and close, except on the first segment.

Habitat.—Santa Fé, New Mexico; Aug. 2nd, 1895; given to me by V. Boyle, with the statement that it was caught on *Cleome serrulata*.

By its face-markings this resembles *C. compositarum*, Rob., but it differs at once from that in its less densely punctured mesothorax, and the longer marginal cell.

NEW HAMPSHIRE HESPERIDÆ.

BY W. F. FISKE, MAST YARD, N. H.

All of the following species occur in the town of Webster, about ten miles north-west of Concord :—

Carterocephalus Mandan, Edw.—This is one of the rarest species in this section. It occurs in but one locality—a grassy bank by the roadside. Middle of June.

Ancyloxypha Numitor, Fab.—Common around very wet, grassy swamps in June and again in August.

Pamphila Hobomok, Harris.—One of the most common ; the third *Pamphila* to make its appearance in the spring, usually about the first of June. Very general in its habit, frequenting both wet and dry land, but preferring a moist, bushy pasture, with plenty of bramble blossoms.

Var. *Pocohontas*, Scud.—Appears about a week later than *Hobomok*. Rather scarce.

Pamphila Sassacus, Harris.—The second *Pamphila* to make its appearance in the spring, about a week before *Hobomok*. Common.

Pamphila Metea, Scud.—The earliest *Pamphila*, appearing about May 15th. It frequents very dry, sandy land, where little vegetation exists, except "bunch grass" and sweet fern. The former—scientific name unknown, but variously known as "bunch grass," "wolf grass," "hassock grass"—is very probably the food plant. Owing to its early appearance and peculiar haunts, it long escaped the notice of previous collectors in this section. One brood only observed.

Pamphila Leonardus, Harris.—The last butterfly to emerge as a first brood. Somewhat common in clover fields last of August and first of September, but rather hard to capture in good condition. With exception of *Cernes*, it is the most difficult *Pamphila* to approach when not feeding.

Pamphila Otho, var. *Egeremet*, Scud.—Rather scarce, frequenting moist roadsides and bushy pastures. First specimen appearing about July 10th. I have a curious specimen (a ♀), probably a variation of this species, in which the spots on both sides of the primaries are larger and more sharply defined, and there is a row of four or five faint spots on the upper side of the secondaries. The clouded band or row of spots on the under side of the secondaries is condensed into a row of distinct small spots, giving it a very different general appearance.

Pamphila Peckius, Kirby.—One of the most common, about equally common with *Cernes*, *Metacomet*, and *Hobomok*. Three broods: it accompanies *Mystic* in June, *Metacomet* in July, and *Leonardus* in August and September. A few specimens on the wing as late as October, which may be fragments of a fourth brood. There is a rather scarce form in which the yellow spot on the under side of the secondaries is divided quite in two, and another form in which the spots on the upper side of the secondaries are missing, giving the male—were it not for the stigma—a very close resemblance to *Cernes* on the upper side.

Pamphila Mystic, Scud.—The most common. Appears about June 5th and again, though very rarely, about September 1st. The male varies considerably; in many cases, when superficially observed, closely resembling *Sassacus*.

Pamphila Cernes, Edw.—Common; appearing about June 15th and again, though rarely, in August. There are probably more variations in this species than in any other native one. One of the most odd is a female in which the subapical spots are entirely wanting and the others are very much reduced in size.

Pamphila Manataqua, Scud.—Rather rare. July 10th to August. All the males yet taken have had a row of four or five indistinct spots on the upper side of the secondaries, but not always on the under side. As is the rule with most species of butterflies, the males appear some time before the females.

Pamphila Metacomet, Harris.—Common; about June 20th or 25th to middle of July. Female varies much in the number and size of the white spots. I have seen specimens of *Cernes*, *Metacomet*, and *Bimacula* (with the white fringe worn off) which it would be almost impossible to tell apart without examining the under sides. I once observed a very ardent courtship carried on by a male *Peckius* towards a female *Metacomet*. The female, however, seemed to be a little disgusted with her admirer, and kept flying about from point to point. The *Peckius* followed her, however, until an unintentional movement on my part frightened it away.

Speaking of inter-special matings, a person who, though not an entomologist, has observed butterflies a good deal, and helped me not a little, solemnly affirmed that he had seen an *Argynnis Idalia* in coitu with *Phyciodes*, sp. This is "coming it a little too strong."

Pamphila Bimacula, G. and R.—Somewhat common in very wet meadows, in June and July. The ♀'s are apparently much in excess,

contrary to the general rule. It flies with a long, straight flight peculiar to this species, dropping suddenly into the grass, and hard to observe unless flushed, owing to its colour being so like the stubble. Because of its peculiar habits it might, like *Pam. Metea*, pass as a great rarity. It has frequently been observed by me feeding on the flowers of *Arethusa*, a very fragrant orchid growing in wet meadows among the grass, and later in the season on swamp milkweed.

Pamphila Delaware, Edw.—One specimen only. July 10th, 1894. Wet meadow.

Amblyscirtes Vialis, Edw.—Somewhat common. May and June.

Amblyscirtes Samoset, Scud.—Not nearly as common as *Vialis*, and not on the wing so early.

Nisoniades Briso, Bd.—Lec.—Scarce. Early June.

Nisoniades Icelus, Lint.—*Common. May, June. It is very possible, as I have given this species very little study, that there may be another species in company with it. According to Scudder, *Lucilius* should be found here.

Nisoniades Persius, Scud.—Scarce in July and August. Probably a second brood, but as it would be difficult to distinguish from *Icelus* on the wing, the first brood might easily escape notice.

Nisoniades Juvenalis, Fabr.—Somewhat common in June.

Eudamus Pylades, Scud.—Very common in June.

Eudamus Bathyllus, Sm. and Abb.—While looking over a series of native *Pylades* this winter my attention was struck by the appearance of a specimen which Mr. Skinner pronounces to be *Bathyllus*. I remember nothing about the capture of the specimen, and never having looked for the species, or expected to meet with it so far north, I can say nothing as to its habits or numbers.

Eudamus Tityrus, Fabr.—Formerly scarce, but of late years common. The last season it was as common as *Pylades*. I have frequently noticed the female hovering over patches of wild bean (*Phareolus perennis*), but not until last season did I find larvæ on this plant. Out of several such larvæ one *Tityrus* emerged this winter from a forced pupa. I have also seen larvæ on garden beans, which were probably this species.

There are several more species of *Hesperidæ* which ought to be found in this locality, but the preceding are all that I have met with. If the season of 1896 is a good one, I hope ere it closes to add something to the knowledge of this family. *

ON TWO INTERESTING NEW GENERA OF SCALE INSECT PARASITES.

BY L. O. HOWARD, WASHINGTON, D. C.

Nearly all the Chalcidid parasites of Coccidæ belong to the subfamilies Aphelininæ and Encyrtinæ. So universal is this rule that it is remarkable to rear anything else from a Coccid (excluding, of course, hyperparasites)*. One or two Mymarids and the species of the curious subfamily Signiphorinæ live in the eggs of scale insects, and we are just beginning to realize that there is a peculiar group of genera allied to the old subfamily Pireninæ which also have this habit.

The first of these insects to be recognized as a primary scale insect parasite was a species of the genus *Tomocera* described by the writer in 1880 and reared from *Lecanium oleæ* from California. This name in 1885 was changed to *Dilophogaster* on account of the occurrence in Thysanura of a genus *Tomocerus*. In the meantime, however, Cameron had erected for the same form, from specimens received from the Hawaiian Islands, his genus *Moranilla*. According to the present rules of classification, however, *Tomocera* may stand in spite of its identical etymological significance with *Tomocerus*.

Another of these genera was described by Dr. Riley in 1890 as *Ophelosia* from specimens reared from *Icerya purchasi* in Queensland. A third—Walker's genus *Eunotus*—has recently been found by Mr. W. G. Johnson to be parasitic upon *Lecanium* scales in Illinois, as pointed out by the writer in Technical Bulletin No. 1, Division of Entomology, U. S. Department of Agriculture, and a fourth—*Scutellista*, Mots.—has been found by Dr. Berlese to parasitize *Ceroplastes* scales in Italy. This form has been redescribed with synonymical notes by the writer in the "Revista di Patologia Vegetale."

Aside from the matter of tibial armature, these genera seem closely allied and to possess on the whole strong mutual affinities. The shape of the head, its acute occipital margin, the mesonotal characters, the 10-jointed (♀) and 9-jointed (♂) antennæ, the greatly enlarged second segment of the abdomen, together with other characters point to a subfamily not yet recognized in our classification of the Chalcididæ, and the uniform Coccid-feeding habit binds the group still more closely together.

* Representatives of *Pachyneuron*, *Euneura*, and *Hypsicanara* have been reared from Coccidæ, but those of *Pachyneuron* are almost certainly hyperparasites, and the others may be; while the species of *Tetrastichus* quite commonly so reared are undoubtedly secondary.

In view of these facts, the receipt of two additional allied genera, also Coccid-feeders, and undescribed, from Mr. W. Maskell, of New Zealand, becomes a matter of considerable interest.

APHOBETUS, n. g.

Female.—Antennæ 10-jointed, clavate, inserted just above clypeus, scape slender, not reaching to middle ocellus, pedicel long, three times as long as first funicle joint, funicle joints 2 to 5 increasing slightly in length and considerably in width, club ovate, slightly broader than funicle joint 5 and longer than 4 and 5 together. Eyes naked; parapsidal sutures meeting axillar sutures; scutellum broad at base, with a distinct transverse groove at apical third. Petiole broad, distinct, abdomen without the white basal tufts characteristic of *Tomocera*, second segment very long, three times as long as remaining segments together. Marginal vein of fore wings somewhat longer than stigmal, postmarginal evident, but shorter than stigmal; basal nervure distinct. Hind wings broad and furnished with a strong basal vein running nearly at right angles into disc of wing for some little distance at extremity of submarginal. Hind coxæ somewhat swollen, middle tibiæ with a moderate spur, hind tibiæ with a very long spur, a little longer than first tarsal joint.

Male.—Differs mainly in antennæ, which are 9-jointed; scape longer than in the female, pedicel somewhat swollen, joints 1 to 4 of funicle with long hairs, strongly incised from above at extremities and each joint slightly pedicillate; joint 1 longest, twice as long as pedicel, joints 2, 3 and 4 each becoming shorter, club somewhat ovate, with its first joint distinctly separated and as a whole longer than funicle joint 4, but shorter than 3 and 4 together. Body flat, abdomen somewhat elongate, second segment somewhat longer than remaining joints together.

Aphobetus Maskelli, n sp.

Female.—Length, 1.16 mm.; expanse, 2.4 mm.; greatest width of fore wings, .51 mm. General colour blue-black, slightly metallic, glistening. Face with faint shallow, sparse depressions; mesoscutum delicately shagreened, abdomen smooth, shining, hairs of mesonotum black, fimbria of metanotum rather sparse, grayish; pleura shining; antennæ honey-yellow, with pedicel and scape above darker; all coxæ and femora black, the latter yellowish at tip; all tibiæ dark in middle, yellowish at either end; wing veins dark brown, except basal vein of fore wings, which is lighter; fore wings with circular fuscous patch occupying centre of wing.

Male.—Somewhat slenderer than female, but about same length; sculpturing identical, antennæ jet black, legs coloured as with female.

One female, four males, reared by W. M. Maskell, New Zealand, from *Ctenochiton viridis*. This is probably the insect figured by Mr. Maskell on Plate XXIII. of his "Scale Insects of New Zealand," 1887.

ANYSIS, n. g.

Female.—Antennæ as with *Aphobetus*, except that funicle joint 2 is twice as long as 1; 3, 4 and 5 subequal in length, increasing in width, and each slightly shorter than 2. Eyes naked; head very broad; occiput strongly concave, its superior margin acute. Thorax well arched; parapsidal sutures meeting axillar sutures; scutellum broad at base, somewhat lengthened, extending over metanotum to vertical plane of base of abdomen, not cross-furrowed. Petiole distinct but very short; abdomen without basal tufts; second segment scarcely half the length of abdomen. Marginal vein of fore wings three times longer than stigmal, postmarginal about as long as stigmal or slightly shorter; basal nervure not distinct. Basal nervure of hind wings extending at an acute angle toward base of wing. Spur of hind tibia short.

Anysis australiensis, n. sp.

Female.—Length, 1.7 mm.; expanse, 3.8 mm.; greatest width of fore wings, .74 mm. General colour blue-black, slightly metallic, glistening. Head and thorax with short, sparse, yellowish pile; face delicately shagreened and with fine sparse punctures; mesonotum similarly punctured; metanotum, pleura, and abdomen smooth; metanotum with a median longitudinal rounded carina. Antennæ light brown, tip of club darker, pedicel and tip of scape above black; all femora nearly black in middle, lighter at either end; tibiæ brown. Wing veins dark brown, fore wings infuscated, hind wings hyaline.

Three females received from Mr. W. M. Maskell with the following note: "With a very curious new Coccid from West Australia, genus not yet determined; probably allied to *Eriococcus*."

MISS ORMEROD, who was for some years Consulting Entomologist to the Government, her knowledge of the insect world being unapproached by any other living authority, has now received the distinction of being appointed an examiner in this branch of agricultural science at Edinburgh University.—*Illustrated London News*.

CORRESPONDENCE.

THE MUTILLID GENUS *CHYPHOTES*.

On Aug. 21, 1894, I found at Santa Fé a specimen of *Chyphotes*, which I thought might prove to be a new species, as the legs are brown, with the femora and tibiæ, except their ends, black. The abdomen is also more elongate than in Blake's figures of *C. elevatus*, and the third segment is fuscous. The length of the insect is 9 mm. Mr. Fox, after comparing it with Blake's types, is persuaded that it is only a form of *elevatus*. It follows the rule already observed in certain bees of the genus *Perdita*, that individuals from higher elevations are darker.

The most curious thing developing from the examination of this specimen was, that Blake's account of the palpi of *Chyphotes* is all wrong. My example has the palpi honey-colour, maxillary palpi 6-jointed, lateral palpi 4-jointed. Formula for maxillary palpi 3 (46) (25) 1. Second joint of lateral palpi broadened. When I called Mr. Fox's attention to this, he wrote back that *C. elevatus* was really similar, the description being wrong.

T. D. A. COCKERELL.

PROPOSED BIOLOGICAL STATION.

The undersigned has it in view to found in New Mexico a Biological Station, and health and holiday resort for scientific persons, teachers, and kindred spirits. No loafers would be admitted, nor persons whose health was so poor as to prevent them from working.

Practically no funds are at present available, but it is hoped that if a very modest start is made, the means may in time be found to put the institution on a secure and permanent basis.

In such an establishment, scientific work may be carried on without any fear of interference by politicians and other self-interested or ignorant persons; while the Station might also come to be recognized as an independent educational centre, helping to promote the best interests of education in the broadest sense, as well as those of pure science.

The promoter hopes to be able, sooner or later, to secure the co-operation of a number of persons who will engage in the work for its own sake, and will not object to necessary privations or be afraid of the inevitable difficulties. Without enthusiasm, nothing can be done.

Three years' experience in this country gives the writer the highest opinion of the value of the climate for persons in the earlier stages of

phthisis (as he was himself when he came here); while the abundance of new and interesting forms of life, especially among the insects, is remarkable. Many interesting general problems, such as those of the life-zones, can also be studied in New Mexico to great advantage.

A beginning will be made this summer if students can be found. The undersigned will be glad to hear from any who are interested in the matter, and especially from those who might be inclined to work with him for longer or shorter periods during the present summer.

T. D. A. COCKERELL,
Las Cruces, New Mexico, U. S. A.

May 4, 1896.

A MOTH OUT OF PLACE.

There has been added to the Society's collection a moth of more than ordinary interest. I sent to Prof. J. B. Smith, for determination, a box of specimens which were to me either new or doubtful. He kindly and promptly returned the same with the names of all except one, which was a *Plusia* quite new to him, and retained it for further study. In the letter to me accompanying the names, the Professor remarked: "No. 12 (*Tæniocampa vegeta*) is rather a surprise to me from your locality. Of course, it is not a *Tæniocampa*, but it has been so described." He then referred me to his catalogue of the Noctuidæ (Bulletin 44, of the U. S. N. M.) for what was known concerning the species. So I turned to it and found this on page 207:

"*T. vegeta*, Morr.

"1875. Morr., Proc. Ac. Nat. Sci., XXVII, 432, *Tæniocampa*.

"Habitat.—Texas.

"The type is in the Tepper collection. A correctly named specimen is also in the British Museum, from the Grote collection. The species is not a *Tæniocampa*, and probably belongs to the fasciatæ; but in default of sufficient study to place it certainly, I leave it here for the present. Mr. Slingerland has called my attention to the fact that *Cissusa spadix*, of Cramer, heretofore referred as a synonym of *Drasteria erecta*, is a distinct species. On examination I find this to be the fact, and it is more than likely that it will prove the same as the above species. Material for study is lacking, therefore the reference can not be positively made."

So it yet remains inaccurately placed from want of sufficient material for study. It seems also to have got far away from its supposed proper place of residence. Taken in London, at electric light, about the middle of April, 1896.

J. ALSTON MOFFAT.

BOOK NOTICES.

THE TAXONOMIC VALUE OF THE ANTENNÆ OF LEPIDOPTERA. BY DONALDSON BODINE, TRANS. AMERICAN ENTOMOLOGICAL SOCIETY, XXIII., PP. 1-56, PLATES I-V., 1896.

Mr. Bodine finds good characters in the finer external structure of the antennæ, especially the sculpturing and the distribution of the different types of sensory hairs. Prof. Comstock's suborders are abundantly confirmed. Not only does Mr. Bodine find that the antennæ of *Hepialus* and *Micropteryx* separate them sharply from all the frenatæ, but he considers the jugatæ even more nearly allied to the *Trichoptera* than to the other Lepidoptera. Mr. Bodine does not attempt a rigid classification of the frenatæ on antennal characters which would have been desirable; but draws attention to a number of special affinities. The only one of these which is at all disturbing to the most recent views is that which implies a close relationship between the *Sphingidæ* and *Sesiidæ* (p. 36). In spite of the close similarity in structure of the antennæ, I do not think that this view which derives the *Sphingidæ* from the *Sesiidæ*, and therefore from the Tineids, will obtain. There seem to be too many objections on other grounds. HARRISON G. DYAR.

THE CRAMBIDÆ OF NORTH AMERICA, by C. H. Fernald, A. M., Ph. D., Massachusetts Agricultural College, 1896.

This little book of less than one hundred pages is really an admirable monograph of this family of Grass-moths. In the introduction, the author briefly relates the injury that is often done by these insects to grass crops, and mentions some of the natural enemies that keep them in check. He then gives an historical account of the family in the writings of Entomologists, and after a chapter on the external anatomy, proceeds to give descriptions of the genera and species, including the preparatory stages as far as known. The synoptical tables of genera and species are excellent, and afford a ready means of identifying a specimen when made use of in connection with the clear and concise descriptions and the beautiful illustrations. Besides a few wood-cuts in the text, there are three plates depicting the anatomy and wing venation of the family, and six exquisite coloured plates of the species. We trust that collectors will now be induced to study this family, as the way has been made so easy for them, and then be encouraged to investigate other families of Microlepidoptera.

Mailed June 4th.

The Canadian Entomologist.

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No. 7.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XVII. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC—(Continued).

TRIBE VII.—EUMOLPINI.

A large group, containing numerous genera and species; the North American forms have been recently studied by Dr. Horn, and the following generic table is a condensation, with a few modifications, of the one given by him.

- A. Anterior margin of prothorax beneath arcuate, forming post-ocular lobes.
 - b. Body above pubescent or scaly.
 - Thorax without distinct lateral margin *Adoxus*.
 - Thorax with distinct lateral margin, size rather large. *Glyptoscelis*.
 - bb. Body above glabrous.
 - c. Small species (not above .16 in.) *Typophorus*.
 - cc. Larger (above .20 in.)
 - Claws simply divergent, legs dark. *Chrysochus*.
 - Claws divaricate, legs testaceous. *Tymnes*.
- AA. Anterior margin of prothorax beneath straight.
 - d. Thorax without distinct lateral margin.
 - Not metallic above; thorax transverse, third antennal joint not longer than the second *Xanthonia*.
 - Metallic green above *Graphops*.
 - dd. Thorax margined.
 - e. Head with distinct supra-orbital grooves, middle and hind tibiae emarginate near the apex *Metachroma*.
 - ee. Head without supra-orbital grooves.
 - f. Lateral margin of prothorax irregular or undulating.
 - Prosternum narrow, contracted between the coxæ. *Colaspis*.
 - Prosternum wide, sides nearly parallel. *Rhabdopterus*.
 - ff. Lateral margin of prothorax regular and entire; third joint of antennæ distinctly longer than the second, the outer five joints not abruptly wider *Nodonota*.

ADOXUS, Kirby.

Represented by *A. obscurus*, Linn., var. *vitis*, Fabr., a broad-shouldered insect about .20 to .25 in. long; the thorax dark brownish or black and much narrower than the yellowish elytra, which are punctate in rows and clothed with a fine whitish pubescence. Legs dark, tibiae paler. The typical *obscurus* has the elytra dark, unicolorous with the thorax.

GLYPTOSCELIS, Lec.

The only record is of *G. pubescens*, Fabr., a rather large (about .35 in.) insect of somewhat parallel form and green-bronze colour, clothed with a pubescence of mixed cinereous and yellowish hairs. The thorax and elytra are confusedly and distinctly punctured; the neighbourhood of the scutellum has a depressed space. Legs more or less reddish.

TYOPHORUS, Er.

T. canellus, Fabr., is one of the most variable of our Chrysomelidæ. It is a small insect, not exceeding .16 in. in length; the thorax narrower than the elytra, which are distinctly punctured in rows. Surface shining. In colour there is such a variation as to have given rise to several varietal names, *aterrima*, Oliv., having been applied to an entirely black form. The name *4-notatus*, Say, belongs to a variety with black thorax and spotted elytra, while *4-guttatus*, Lec., has a yellow or reddish thorax and spotted elytra. Others occur, but not having been recorded from the region under consideration, they are passed by for the present. A full account of them will be found in Dr. Horn's paper.

CHRYSOCHUS, Redt.

A common species on the Dog's-bane (a milk-weed) is *C. auratus*, Fabr., a large green-bronze beetle, about .40 in. long, often with the most brilliant golden reflections. The body is rather more elongate in form than the preceding species and very convex. There is also a record of *C. cobaltinus*, Lec. (properly a Pacific Coast species), which is of blue colour, sometimes with a touch of green.

TYMNES, Chap.

L. tricolor, Fabr., is a rather brilliant beetle, about .25 in. long, metallic green or bronzed in colour, the legs almost always reddish or yellowish, the upper lip pale. Elytra coarsely punctured, acute at apex; "anal segment often pale, especially in the males, in which sex that segment is broadly emarginate and with a transverse depression" (Horn).

XANTHONIA, Baly.

Here belong two Canadian species. They are small beetles with broad elytra and narrower thorax, as in *Adoxus*, the upper surface finely pubescent. Dr. Horn separates them thus:—

Punctures of elytra very confused, with a feeble seriate tendency towards the sides; elytra usually dull ochreous with piceous spots, but sometimes entirely fulvous. .12 in. *decemnotata*, Say.

Punctures of elytra much finer and arranged in regular series, but slightly confused near the suture; colour usually pale fulvous, varying through brown or piceous, not spotted.

.12 in. *villosula*, Mels.

With the last species is united *X. Stevensii*, Baly.

GRAPHOPS, Lec.

Small species of more than usually cylindrical form and metallic green or coppery colours. The prothorax is rugose, at least on the sides, and the elytra pubescent with rather large striae composed of distant punctures. The two species from the region under consideration are:—

Larger (.16 in.). Prothorax punctured, rugose at sides. *pubescens*, Mels.

Smaller (.10 in.). Prothorax rugosely punctured over the whole disk. *curtipennis*, Mels.

METACHROMA, Lec.

Contains species which resemble in form the well-known *Typophorus*, but with post-ocular lobes. Two are found in Eastern Canada.

Posterior femora simple; thorax densely punctate, somewhat strigose; usually black, elytra sometimes with a humeral and apical spot (occasionally united along the margin) dull red. Legs pale in Northern specimens. .12-.14 in. *quercatum*, Fabr.

Posterior femora with a small tooth on lower edge about one-third from the knee; thorax scarcely at all punctate; colour variable, from entirely pale through forms with black thorax, suture and elytral spots to those completely black excepting the legs. .13-.18 in. *dubiosum*, Say.

COLASPIS, Fabr.

Here belongs *C. brunnea*, Fabr. (*suilla* of the Society's List), a pale brownish or yellowish beetle, of oblong-oval form, the elytra costate, the

spaces between these costæ being occupied by two irregular rows of coarse, deep punctures. It is extremely variable and the varieties have received names as follows: *suilla*, Fabr., is applied to the form in which the head and thorax are brown with slight metallic lustre; *costipennis*, Cr. (*Crotchii*, Lefvr.), to those specimens with brilliantly metallic head and thorax and brown elytra with yellow costæ; while *flavida*, Say,

is the yellowish-testaceous form, merely a little darker beneath.

[Horn.] Length, .16-.24 in. Fig. 17 represents *C. flavida*, natural size and magnified. Fig. 18, the larva, highly magnified.



Fig. 17.

RHABDAPTERUS, Lefvr.

The insect formerly known in collections as *Colaspis prætexta*, Say, has been referred to this genus, and Dr. Horn has substituted the older name, *picipes*, Oliv., therefor. It will therefore stand as *Rhabdapterus picipes*, Oliv. It is a rather brilliant bronzed or greenish insect, .16-.20 in. long, of oblong-oval form, very convex above. The antennæ are testaceous with darker tip, under surface of body greenish, abdomen brown, tip paler, legs testaceous. Elytra with coarse, irregular punctures on the disk, apex substriate.



Fig. 18.

NODONOTA, Lefor.

Includes species formerly placed in *Colaspis*. Our species are all rather small insects, of convex form, something like *Colaspis*, but shorter in proportion; in colour more or less metallic, bluish or greenish, legs piceous or testaceous. Dr. Horn separates the three species (formerly recognized only as varieties) found in our region as follows:—

Form short, oval, punctuation of prothorax simple.

Upper surface shining; metasternum not punctate at sides. .11-.15 in. *tristis*, Oliv.

Upper surface dull; metasternum coarsely punctate at sides. .15-.18 in. *convexa*, Say.

Form oblong, subparallel, punctuation of prothorax substrigose; elytra with distinct costa behind the umbone.

.13-.17 in. *puncticollis*, Say.

NOTES ON SOME MOTHS FROM THE COLLECTION OF
MR. A. BOLTER.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Hepialus hyperboreus, Möschler.

This species exhibits a well-marked local variation. Before discussing this I would correct the account in Journal N. Y. Ent. Soc., II., 168, in respect to the synonymy of *confusus*. This form is really the same as *roseicaput*, N. & D., as the description shows. How we were misled into referring the name as a strict synonym, I cannot now recall. It may be well, moreover, to retain a distinct name for the American form until its life-history is known and we can be certain whether it is or is not the same as the European *ganna*.

H. hyperboreus occurs throughout the northern and mountainous parts of North America, from the Atlantic to the Pacific. It is recorded from Labrador [Möschler]; Mt. Washington, N. H. [Mrs. Slosson]; Colorado [Grote]; Calgary, Alberta [Wolley Dod]; Sierras of California [Hy. Edw.]; Vancouver I., B. C. [Bolter]; Cascade Range, B. C. [Neum. & Dyar]; and Alaska [H. Edw.].

The colour of primaries is brown, varying from dark to pinkish or yellowish-brown; the silvery markings are complete in all the specimens from the Rocky Mountains and eastward and south of Oregon. In the Northwest, the silvery marks begin to be distinctly replaced by the blackish shades which form their borders in specimens from Vancouver Island (*Matthewi*). In the Cascades and Alaska the specimens have no silvery marks, but are banded only with smoky blackish. The size of the specimens is variable. The largest that I have seen is Mrs. Slosson's example from Mt. Washington (50 mm.), and the smallest are some of the specimens of *McGlashani* (30 mm.). The usual size is close to 40 mm., ranging larger in the East. From present information, I would arrange the varieties and synonymy thus:—

HEPIALUS HYPERBOREUS (= *ganna* of Europe?).

hyperboreus, Möschler, 1862. Labrador and Mt. Washington; expanse, 40–50 mm.

pulcher, Grote, 1864. Colorado, and Alberta, Canada; expanse, 36–38 mm.

McGlashani, Hy. Edw., 1886. Truckee, California; expanse, 30–39 mm.

intergrade, MATTHEWI.

Matthewi, Hy. Edw., 1874. Vancouver Island, B. C.; expanse, 35-41 mm.

local race, CONFUSUS.

confusus, Hy. Edw., 1884. Alaska; expanse, 44 mm.

roseicaput, Neum. & Dyar, 1893. Cascade Range, B. C.; expanse, 33 mm.

SYNOPSIS:

Yellowish or reddish-brown, full silvery white marks....*hyperboreus*.

Reddish-brown, the ground colour irregular or spotted with yellowish; silvery marks more or less replaced by smoky black....*Matthewi*.

Pinkish or yellowish-brown, white marks all replaced by smoky black.....*confusus*.

Alexicles aspersa, Grote.

A fresh specimen from Las Vegas, N. M. (The type is rubbed.)

Thorax thickly haired, dark gray-brown, touched with white at the bases of the anterior wings, along the collar on the sides below the fore wings; eyes posteriorly margined with red. Upper side of all the femora and the tips of the tibiae and the tarsal joints bright red. Abdomen bright red above except at base and a series of dorsal dark brown spots; gray-brown below, the last two segments tipped with whitish. Fore wings rather thin, grayish-brown, with five transverse rows of dark brown spots and a large discal spot, cutting the otherwise white veins. Expanse, 32 mm. *Macrurocampa Dorothea*, n. sp. (Fig. 19.)

Primaries ash-gray with a lilac tint, composed of black and gray scales, quite uniform, without any contrasting pale shades. Basal space up to the t. a. line shaded with blackish-gray, filled in uniformly except the extreme base, which is pale, and a distinct longitudinal black line along vein 1 to the t. a. line, bordered on its lower side by an ochreous shade. T. a. line bounding the dark space, geminate, obscure, blackish, outwardly angled on median vein and inwardly in submedian space. Discal spot lunate, black, confined to the cross-vein. Beyond it the faint, narrow, wavy, black t. p. line crosses the wing, paralleled by a fainter median shade through the discal dot itself and beyond by a row of small venular black dots, the three lines ending on the internal margin in a darker shade of



the ground colour. In the interspace of veins 3-4 and 6-7 basally, a triangular patch of the same ochreous tint as borders the basal longitudinal line below. Subterminally a distinct black band issues from the apex, slightly toothed outwardly on the veins, inwardly on the interspaces, and proceeds to vein 4, where it is interrupted; but reappears at vein 3, curving inward and reaching a little way along submedian fold, where it ends. Terminal field gray, scarcely lighter than the general ground,irrorate with black. Fringe dark, with obscure venular spottings. Abdomen and secondaries smoky gray, secondaries whitish at basal half. Thorax dark iron-gray, black and white hairs intermixed, the head and under side of thorax paler.

Type, one female. Las Vegas, New Mexico; collection of Mr. A. Bolter, Chicago.

The only Southern species which seems to approach this form is *Heterocampa surinamensis*, Möschler.

NOTE ON TRIGONOGENIUS FARCTUS.

BY E. A. SCHWARZ, WASHINGTON, D. C.

Thirty years ago Dr. Leconte described (New Species, Smithsonian Misc. Coll., 167, p. 100) the Ptinid *Trigonogenius farctus* from specimens received from San Francisco, Cal. Most specimens in our cabinets come from the same locality, but I have seen others from Alameda and Los Gatos, Cal. The collectors of the specimens never published anything on its mode of occurrence, and I fail to find in the literature a single record of its habits. Quite recently, however, Dr. James Fletcher, while on a visit to Washington, D. C., showed me two species of Coleoptera found living in red pepper, in Victoria, Br. Col. One is *Tribolium ferrugineum*, a common cosmopolitan Tenebrionid, which has been found before under similar conditions; but the second species proves to be *Trigonogenius farctus*. Several specimens of this were obtained, thus showing that its occurrence in the pepper was not accidental, and I have no doubt that upon further research the earlier stages of the beetle can also be found in the pepper. [Larvæ of all sizes and cocoons with pupæ in them occurred in this consignment of pepper, which was sent to me by Mr. E. A. Carew-Gibson, of Victoria, B. C.—J. F.] Dr. Fletcher informed me that Victoria gets much produce from San Francisco, and we may

thus infer that the infested red pepper came from that place. On this and various other points connected with the economy of this species, Dr. Fletcher will no doubt be able to furnish further information.

Various Ptinid beetles, *e. g.*, *Plinus fur*, *Sitodrepa panicea*, *Lasioderma serricorne*, are very fond of red pepper, and the occurrence of *Trigonogenius* in this substance is therefore not surprising, but it brings up another point for consideration. All insects which we find in this country living in groceries, drugs, etc., are of foreign origin, or at least do not belong to the Nearctic fauna. The insects native to North America do not seem to be able, or are not inclined, to adopt this mode of life, and thus it may be questioned whether *Trigonogenius farcus* really belongs to our fauna. Its general appearance certainly bespeaks a foreign origin. The genus *Trigonogenius*, as restricted by recent authors, contains only two described species: *T. globulum*, Sol., from Chili, and *T. squalidus*, Boield., from New Grenada*, and upon comparing the original descriptions the identity of our species with *T. globulum* appears to me quite possible. I have, however, not seen Solier's figure, and a comparison with the type is apparently necessary to decide this question.

The mere feeding of these beetles and their larvæ cannot be said to injure the red pepper, which does not lose its pungent quality by passing through the bodies of insects. But should the *Trigonogenius* be very numerous, the presence of the silken pupal cocoons would cause some inconvenience and loss.

While speaking of imported Ptinidæ, I would add that at least two Old World species are most likely to find their way to North America sooner or later. One is *Niptus griseofuscus*, DeGeer (*Plinus crenatus*, Fabr.), which appears to be a native of Europe, where it commonly occurs in old straw in cellars and stables. The other species is *Niptus hololeucus*, readily known by the appressed golden-yellow pubescence covering the entire body. It is probably a native of Asia Minor, whence it was imported into Great Britain about sixty years ago. It occurs now at many points in Western and Central Europe, not only living in all sorts of spices and drugs, but also proving to be injurious in various ways. It would be a most undesirable addition to our fauna.

*The two species described and figured by Gorham in Biol. Centr. Amer. are certainly not congeneric with *T. globulum*.

THE SMALLER BEES OF THE GENUS *ANDRENA* FOUND
IN NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, NEW MEXICO.

None of the species herein described or listed are as much as 10 mm. long.

i. Marginal cell truncate.

The species of this section are not true *Andrena*, but will form a distinct genus, apparently as near to *Prosapis* as to *Andrena*. Two of the larger species, *A. asclepiadis*, Ckll., and *A. mexicanorum*, Ckll., are congeneric. I have before me also a species from Texas.*

i. Tarsi piceous in female.

Andrena trifoliata, n. sp.—♀. Length nearly 10 mm. Closely similar in all respects to *A. maurula*, but differing in being slightly smaller, the eyes dull slate colour, not at all greenish; the clypeal mark smaller, paler, and more distinctly trilobed; the front more sparsely punctured, with minute punctures between the large ones; the last 6 or 7 joints of the flagellum becoming testaceous; the wings not rufescent, but the apical half slightly smoky; the third submarginal cell more narrowed above, the first recurrent nervure entering the second submarginal cell at the end of its second third; the legs black; the abdomen with the basal white hair-bands on segments 3 and 4 entire; the hairs on venter very few, and whitish. The metathorax and postscutellum are quite black, not at all brownish. The pale, cream-coloured face-mark is shaped something like a vine leaf.

**Andrena maurula*, n. sp.—Female. Length nearly 10 mm. Black, no more pubescent than a *Prosapis*, strongly punctured. Head broader than long, face very broad; eyes rather small, dull olive green; clypeus arcuate below, its upper half, just enclosing the black dots, and extending as a rounded lobe downwards in the median line, pale primrose yellow. A very narrow, sometimes interrupted, pale yellow supra-clypeal transverse mark. Labrum prominent, truncate, with a small longitudinal keel. Clypeus with large but rather sparse punctures, median line impunctate. Front and vertex closely punctured. Antennae short, dark brown, scape punctured. Thorax somewhat shining, bare except the minutely pubescent hind border of prothorax, lower part of pleura, and lateral angles of metathorax. Median and parapsidal grooves distinct. Mesothorax and scutellum strongly and closely punctured; postscutellum and metathorax slightly brownish, coarsely granular, or so closely punctured as to seem so; metathorax with a deep pit, enclosure not defined, except by an impunctate band at sides, basally very obscurely wrinkled. Tubercles light yellow, tegulae testaceous with a yellow patch. Wings stained with ferruginous, nervures and stigma dark rusty brown, marginal cell truncate. Legs dark brown, the four anterior knees light yellow. Abdomen strongly and closely punctured, segments after the first with more or less distinct lateral basal white hair-bands. Anal hembra ochreous. Hairs on venter more or less tinged with ochreous.

Habitat.—Texas: three collected by Belfrage, and now in U. S. Nat'l Museum. One bears the number 237.

Habitat.—Albuquerque, N. M.; two, on June 30th, 1895, between the town and the University [Ckll., 3254, 3256.].

ii. Tarsi rufous in the ♀; yellowish white in the ♂.

Andrena heteromorpha, n. sp.—♀. Length about 8 mm.; similar in build and general appearance to *A. trifoliata*, but rather more slender. Black, no more pubescent than a *Prosapis*, face-mark and tubercles pale primrose yellow. Head a little broader than long; eyes black; supra-clypeal mark very narrow, as in the other species of the group, forming the base of the clypeal mark, which is trilobed below, much rounder in general outline than that of *trifoliata*, decidedly longer in proportion to its breadth than in that or *maurula*. Mandibles simple, rufous, with the tips blackish and the bases becoming yellow. Face and front shining, strongly but irregularly punctured, vertex strongly and closely punctured. Antennæ black, the flagellum from the 4th joint becoming rufous beneath. Tubercles pale yellow with a black spot near the hind margin. Mesothorax shiny, closely punctured, parapsidal grooves distinct. Scutellum closely punctured. Postscutellum and metathorax coarsely granular, base of metathorax with small, ill-defined longitudinal wrinkles. Tegulæ testaceous, with a triangular pale yellow spot; wings smoky hyaline, nervures and stigma dark brown, the former ferruginous at base of wing. First recurrent nervure entering second submarginal cell at the end of its second third. Legs black, first four knees yellow, hind knees ferruginous; tarsi ferruginous, first joint of middle tarsi quite broad. Abdomen strongly and closely punctured, without distinct hair-bands or spots, but the last two segments pruinose with white pubescence. Anal fimbria pale ochreous.

♂. Smaller and more slender, the abdomen subcylindrical. Face wholly pale primrose yellow below level of antennæ, the upper margin of the yellow straight, only notched on each side of the dog-ear marks, and produced narrowly a short distance along the orbits. Basal portion of mandibles externally all pale yellow. Antennæ entirely dark, not at all rufescent. Second submarginal cell very narrow. Anterior tibiæ pale yellow in front; all the tarsi cream colour, except the darkened terminal joint. Abdomen with the last four segments primrose. Punctures of basal segment not so close.

Habitat—Las Cruces, N. M.; close to the Agricultural College, on *Verbesina encelioides*; Sept. 12th, 1895 [Ckll., 5056, ♀; 5058, ♂.].

2. Marginal cell pointed.

- i. ♀ with wings tinged yellowish, stigma pale ferruginous, abdomen impunctate; ♂ with clypeus dark; hind tarsi clear ferruginous in both sexes.

Andrena salicinella, Ckll., Psyche Suppt., 1895, p. 4. The type was taken on willow, but was unique, and among many bees collected on willow at the same place, May 2nd and 3rd, 1896, are no *salicinella*. Both sexes were, however, taken in quantity on *Sisymbrium canescens*, on the College Farm, Mesilla Valley, N. M., April 12th and 16th, 1895, the males predominating.

The ♂ differs by the face being covered with dense white pubescence, the flagellum ferruginous beneath; the wings clear, not yellowish; the stigma reddish brown, darker than in the ♀; the abdomen narrower, but distinctly banded. When I published *salicinella*, Miss J. E. Casad had already described the species as new (in MS.) from the ♂, but I was not aware that her insect was the opposite sex of mine.

Miss Casad has described (in MS.) another species from a ♂ taken on *Krynitzkia* (supposed to be *K. Jamesii*), on Little Mountain, Mesilla Valley, April 1st, 1895. This is smaller than ♂ *salicinella*, and the head seems very much broader in proportion to its length; but the latter feature is probably due, at least for the most part, to the retraction of the mouth-parts and the absence of the dense white clypeal pubescence, except at the sides. My present opinion is that it is probably an individual mutation of *salicinella*, but it may be a distinct but closely allied species.

- ii. Wings not tinged yellowish, hind tarsi not clear ferruginous.

- a. Clypeus dark in the ♂, abdomen tessellate but impunctate.

Andrena monilicornis, n. sp.—♂. Length about $8\frac{1}{2}$ mm. Black, with long dull white pubescence. Head broader than long, face densely covered with long white hairs, cheeks less densely; vertex bare, flattened or even slightly concave, microscopically reticulate, and with large, rather sparse punctures. Antennæ long, wholly black, the joints somewhat swollen, moniliform, first joint of flagellum not longer than the third. Mandibles wholly black. Thorax covered with long hairs; the prothorax, disk of mesothorax, scutellum, and enclosure of metathorax, bare. Mesothorax rather dull, with large, rather sparse punctures. Scutellum shiny, with sparse punctures; a small impunctate space on each side of the middle. Enclosure of metathorax dull, minutely roughened, bounded only by an impressed line. Tegulae shining dark brown. Wings hyaline, iridescent, nervures and stigma testaceous, costal nervure black. Second

submarginal cell very broad, receiving the first recurrent nervure at its middle. Legs black, apical joints of tarsi becoming dull ferruginous. Femora with very long white hairs. Abdomen moderately broad, having a silky lustre, strongly minutely tessellate, impunctate. All the segments sparsely hairy, their hind margins with thin white hair-bands, failing in the middle. Venter with continuous white hair-bands. Apex with white hairs.

Habitat.—College Farm, Mesilla Valley, N. M.; on plum; March 25th, 1896.

b. Clypeus pale primrose yellow in the ♂, abdomen punctate.

- (1) Larger, distance between the clypeal dots in ♂ not greater than distance from one to top of clypeus.

Andrena capricornis, Casad and Ckll, n. sp.—♂. Length, 8 mm.; stoutly built; black, with dull white pubescence; clypeus and a large mark on each side of it very pale primrose yellow. Head broader than long, face and front with rather long but thin pubescence; clypeus large, unusually high, almost bare, with scattered punctures; there are either two minute gray dots or there may be two gray bands, extending upward and laterad from the position of the dots, meeting each other at a right angle. The lateral face-marks are irregularly diamond-shaped, the upper outer margin notched. Vertex roughened, a polished, sparsely punctured area at the summit of each eye. Antennæ fairly long, black, the tip of the flagellum beneath becoming dark coffee-colour. First joint of flagellum about as long as second and third together, second not as long as broad. Mandibles wholly black; lower margin of clypeus black, arcuate; basal process of labrum emarginate. Thorax quite densely pubescent; mesothorax dull, rather closely punctured; scutellum shiny, irregularly punctured; enclosure of metathorax granular, bounded only by an impressed line. Tegulæ dark chestnut brown, wings hyaline, nervures and stigma dark reddish brown, costal nervure black; second submarginal cell narrowed above, receiving the first recurrent nervure just before its middle. Legs black, pubescent, apical joints of tarsi becoming more or less rufescent. Abdomen rather broad and short, punctured, only moderately shiny, clothed all over with thin white pubescence, which forms ill-defined bands, interrupted in the middle, on the hind margins of the segments. When the insect is viewed from the side the bands on segments 2 to 4 look very white and distinct, as, indeed, do those on 2 and 3, viewed from above.

Habitat.—One on plum, College Farm, Mesilla Valley, N. M., April 9th, 1895 [Casad, 161]; another on plum, same locality, March 25th, 1896 [Ckll.].

- (2) Smaller, distance between the clypeal dots in ♂ much greater than distance from one to top of clypeus.

Andrena primulifrons, Casad, n. sp.—♂. "Black, pubescence ashy, head broader than thorax; clypeus and lateral spots somewhat triangular in shape, their longest side toward clypeus and extending a little above it on sides of face, pale lemon yellow; clypeus broader than long, with black dots about half way between upper and lower edge and separated from each other by about the length of the clypeus; rest of head black, face clothed with ashy hairs and fringed at its base, vertex bare, occiput and cheeks clothed with long hair; antennæ testaceous beneath; thorax clothed same as head, hairs longest on pleura, very sparse on metathorax; wings hyaline, iridescent, nervures piceous; legs with hairs, sparsest and longest on femora; abdomen sparsely clothed with short hairs; segments banded apically. Length about 6 mm. Its general appearance is much like that of *Halictus fasciatus*." [Jessie E. Casad.]

♀. "Black, having an oily appearance, pubescence grayish, mixed with ochraceous; head very little broader than thorax, face as long as broad, clothed sparsely with short pale ochraceous hairs, those on clypeus very scattered; antennæ pale brown from fourth joint to tip beneath; thorax clothed similarly to head, metathorax bare, punctured and fringed marginally; wings hyaline, third submarginal cell long, narrowed more than one-half toward marginal, stigma fulvous, tegulae testaceous; legs dark brownish, clothed with pale hairs, heaviest on tibiae and tarsi; last joints of tarsi reddish; abdomen punctured, clothed with fine, short, scattered hairs; apical marginal bands interrupted on segments one and two; bands entire on following segments." [Jessie E. Casad.]

Habitat.—Mesilla Valley, N. M.; Little Mountain, April 1st, 1895, on *Krynitzkia* (supposed to be *K. Jamesii*), a ♀ [Casad, 154]; Campus of Agricultural College, on flowers of *Biscutella Wislizenii*, April 9th, 1896, a ♀ [Ckll.]; on plum, College Farm, April 10th, 1895, a ♂ [Casad, 187]; on plum, College Farm, March 25th, 1896, a ♂ [Ckll.]; on *Sisymbrium canescens*, College Farm, April 16th, 1895 [Ckll., 2790, 2742].

Miss Casad had described the sexes as distinct species, but they are doubtless one. The stigma varies in colour, being sometimes reddish

fulvous, sometimes brown; but its margin is always conspicuously darkened below. The enclosure of the metathorax is strongly granular, contrasting with a comparatively shining area on each side of it. The nervures in the ♀ are distinctly darker than in *salicinella*.

P. S.—June 2nd, 1896. After renewed study, and an examination of the tongue and palpi, I am satisfied that the supposed species of *Andrena*, described by me with the marginal cell truncate represents a valid new genus, which I will call *Protandrena*. The species are as follows: *P. asclepiadis*, *P. mexicanorum*, *P. trifoliata*, *P. maurula*, *P. heteromorpha*.

LEPYRUS ALTERNANS AND CAPUCINUS, LIXUS FOSSUS, CREMASTOCHILUS HARRISII AND POLYPLEURUS NITIDUS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Lepyrus alternans, Casey.—In a former paper (p. 125) the form described under this name was united with *Capucinus*, Schall, owing to an error of observation in regard to the wings. The example then examined was somewhat broken and it is now evident the wings had been removed. A recent dissection of a perfect specimen exhibits a well-developed pair of wings. This form is closely related to *palustris* (perhaps not more than a geographical variety), differing in the form of the thorax, which, instead of being conical, is much wider at middle than at base (subangulate); the rostrum is perhaps stouter and the mesosternum less elevated—both characters somewhat opinionative; there is no femoral tooth in any of the examples seen; the elytral intervals are less regular, either not obviously unequal or the first and third wider, the others narrower and some of them longitudinally sulcate along the middle; the striae punctuation is usually finer and closer, and the striae seem to be acutely impressed when the elytra are perfectly denuded. In vestiture ornamentation and other characters the two forms seem identical.

All the examples seen have been from Maine and New Hampshire (Mount Washington and vicinity).

L. capucinus, Schall.—The removal of *alternans* from synonymy with this species necessitates a little change in the former description, where some of the characters peculiar to the latter form were introduced:—

Apterous, black, robust, vestiture nearly uniform. Rostrum stout, longer than the thorax, sulcate on each side of the carina which attains the frontal fovea, rather closely and not coarsely punctured, and with the head thinly clothed with squamoid hairs; scape of antennae short, not attaining the eye; first joint of funicle stout, second thinner and

two-thirds longer, ferruginous to piceous. Thorax transverse, wider than long, sides nearly parallel to apical third, then rapidly rounding to apical constriction; apex one-fourth narrower than base subconvex, surface even, closely covered with granuloid tuberculations, smaller on the disk, larger and rugous on the sides; median carina fine, mostly attaining the base. Elytra oval, striato-punctate, striae when denuded slightly acutely impressed, intervals not obviously unequal, granuloid tubercles fine and sparse; apices conjointly rounded, notch very slight. Anterior femora with the sinuation for the tibiae strongly rectangularly laminate and usually the middle and posterior; mesosternum elevated between the coxae. The vestiture is very uniform, mostly of white and gray fine hairlike scales tessellated on the elytra, sparser below; the median spot on the elytra usually seen in the other species is absent, but there is a white one on each apical protuberance; the femora are not annulated and the abdominal spots are wanting. The American examples seen are from Michigan; the European, from Hungary.

L. gemellus, Kirby.—This elegant species was taken by Mr. F. C. Bowditch, in the Rocky Mountains near Eagle Pass, at an elevation of 13,000 feet or over, examples of which, through his courtesy, I have been enabled to see. From these the recorded distribution is Vancouver Island; Alaska (the Peninsula of Kenai and the adjoining Continent, also the Yukon); the Hudson Bay region to Lat. 65°. In the former notice, p. 126, the word "scalerous" should read scabrous.

Lepyryus palustris.—Examples from Indiana in the cabinet of F. H. Snow, Chancellor of the University of Kansas, are absolutely identical with the cylindrical, long-beaked European form usually sent to America.

Lixus fossus, Lec., 1876, Proc. Am. Phil. Soc., XV., 417; *luculentus*, Casey, Ann. N. Y. Acad. Sci., VI., 209.

Fossus was described from a unique taken at Enterprise, Florida; *luculentus* from examples taken at Lake Worth, Florida, about 250 miles southward. Except in size, the individuals of this species are little variable, but enough so to make two or three species of by any one inclined in that direction. Mr. Casey's types seemingly differ from Dr. Leconte's in three or four points which more ample material shows to possess only individual value. The material in my collection, ♂ and ♀, is from near Jacksonville and from Lake Worth, the latter due to the munificence of Mrs. Slosson, who recently sent me nine examples. The ♂ examples from Jacksonville agree with Dr. Leconte's description of the thorax and basal fovea, the ♀ with his description of the supposed ♀ which is the ♀ of Mr. Casey's *luculentus*. In the males of the examples from Lake Worth the thorax and basal foveæ are diverse, some as in *fossus*, some as in *luculentus*, and others intermediate. The characters drawn from the beak are likewise mutually intermixed.

The following description drawn from 10 male examples illustrates

the principal characters of the species, with the most noteworthy differences observed among individuals:—

Beak about as long as the thorax, sometimes longer, mostly shorter; a broad transverse impression between the eyes more or less evident; a round frontal fovea, a smaller elongate one between the insertion of the antennæ sometimes obsolescent; in some examples a trace of a carina between the foveæ, but usually not; punctuation fine and sparse to coarser and denser, clothed with minute whitish scales to tip; antennæ inserted about one-third from apex, slender, light to dark ferruginous; club mostly darker; thorax about as long as wide, sometimes longer, sometimes shorter, conical; process of base prolonged more or less acutely between the elytra in place of the scutellum, which is not visible; fossa deep, sometimes limited at basal third, sometimes the impression extends to middle and sometimes narrowly to apical margin, densely rugoso-punctulate; some fine punctures, mostly on the sides; elytra not or but little wider than the thorax, with irregular series of moderately coarse punctures, of which the inner three are usually well defined; tips separately acutely rounded and conjointly emarginate; uniformly mottled with condensed spots of short white scaly pubescence, as is likewise the thorax and under side, the latter also ornamented with numerous denuded black dots; femora annulate with white.

Length, .30-.40 inch. Habitat.—Common from Jacksonville, Fla., southward.

The denuded elytral area mentioned by Mr. Casey is entirely due to abrasion, as is also that of the disk of the thorax, neither being present in recent specimens. The surface in some of the examples is covered with a yellow pollenoid powder such as is seen in *concausus*. The female seemingly differs from the male only in the more cylindrical, slightly longer, less pubescent, and more finely punctulate beak, with the antennæ inserted near the middle, and the usually longer thoracic impression.

Cremastochilus Harrisii, Kirby.—This species was taken, by myself, with ants (species not observed) in Western Pennsylvania [CAN. ENT., XX., 160]; also in Florida, with a large ant inhabiting under a board [Ib., XXVI., 255], which Prof. Schmitt names *Camponotus floridanus*. In March, 1895, I took an example with the same species of ant at Lake Worth, under circumstances somewhat different from the ordinary. A small pine had been broken off by a wind-storm about six feet from the ground, the broken end resting on the stump; under the loosening bark of the tree a colony of ants had formed a nest, and in it was this *Cremastochilus*; the ants were in great consternation at the exposure of their habitation, and while anxious and in much hurry to remove their pupæ to places of safety, they appeared to be equally solicitous about the *Cremastochilus*, several of them laying hold of it and dragging it with them. At first it simulated death, but after having been dragged awhile it got up and walked off quite lively under their guidance.

Polypleurus nitidus, Lec.—This fine beetle, rather rare in collections, is abundant along Lake Worth, Florida, in pine hummocks where there are stumps. The larva when full-grown is about an inch and one-half in

length, cylindrical but a little flattened, about one-eighth of an inch in diameter; the body is hard, solid, and not easily crushed; the mandibles large, sharp, and powerful enough to draw blood; the colour is pale yellow with the head piceous. It is very active. The beetle breeds in pine stumps which have been cut two or three years and have dried out; the larvæ devour the solid wood always in a vertical direction, two or three dozen of them being frequently found in a stump six or eight inches in diameter, the inside of which is mostly reduced to powder by the time they are ready to pupate. I took the beetle from February to May, and it may possibly disclose at all times during the year.

This species is probably not confined to pine, as I took it frequently quite remote from any pine, under boards, bark, etc., and I strongly suspect that it breeds in roots, etc., after the manner of some of the Elaterid larvæ called "wireworms."

TWO NEW HESPERIDS.

BY HENRY SKINNER, PROF. ENT., ACAD. NAT. SCI., PHILADELPHIA.

Pamphila Howardi, n. sp.

Male.—Expands 1.50 inches. *Upper side*: Superiors tawny with a fuscous border a little more than one-eighth inch in width; there are from one to four small subapical tawny spots in the fuscous border; at end of cell a dark spot which may or may not be connected with the stigma; stigma rather more than an eighth inch in length, very narrow and unbroken, and extending to inner margin. Inferiors have the same fuscous border and tawny central area. *Under side*: Superiors with tawny central area and border same as upper side; there is a large triangular spot extending into the wing from the base. The tawny colour above this spot is of a darker hue than that below and outside of it. Inferiors very light brown, generally with four or five very faint tawny spots in the central area.

The females are larger, without the stigma and have the under side of inferiors immaculate. Described from eight specimens in my own collection and four in that of the U. S. National Museum, through the courtesy of Prof. L. O. Howard. They are all from Florida; two being from Georgiana, on the Indian River; exact locality of others unknown. This species has usually been confounded with *viator*, but is really nothing like it. The species belongs to the *arpa*, *palatka*, *Aaroni*, *viator* group. It

is a much larger species than *Aaroni*; it has not the bright immaculate inferiors below like *arpa* and differs from *palatka* in the stigma, which in that species is in two short sections. The superiors in *viator* above are fuscous, covered with tawny spots.

Pamphila stigma, n. sp.

Male.—Expands $1\frac{1}{4}$ inches. *Upper side*: Superiors bright yellow; border fuscous, about one-sixteenth of an inch in width; the fuscous extending slightly inwards into the yellow between the veins. Stigma broad, black, and semicircular; very wide in proportion to its length; extending from stigma toward tip of wing is a rectangular fuscous spot. Inferiors fuscous with an orange central area which is broken into four or five spots by the nerves. *Under side*: Superiors yellow with the usual fuscous patch at base; there are five fuscous spots on the outer third of wing, which begin at the inner margin and extend upward, each one being smaller than the other as they extend toward the outer third of the centre. Inferiors bright yellow, a few small fuscous spots scattered about the wings. From several specimens in the collection of the author and Dr. Herman Strecker, of Reading, Pa., from southern border of New Mexico and S.-W. Texas. This species somewhat resembles *brettus* and *phylaes*, but can be known at once by the stigma, which is like that of *campestris*.

ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The Association of Economic Entomologists will hold its eighth annual meeting in the Library Building, Buffalo, N. Y., on Friday and Saturday, August 21st and 22nd, 1896. The first general session of the American Association for the Advancement of Science will be held on Monday, August 24th, 1896.

It is earnestly requested that members of the Association of Economic Entomologists should promptly inform the Secretary whether they expect to be present or not, and also submit immediately the titles of communications they desire to present, to enable the distribution before the date of the meeting of a preliminary programme.

Full information relating to railroad rates, hotels, etc., is given in the preliminary bulletin of the American Association for the Advancement of Science, a copy of which may be obtained by addressing the local Secretary, Mr. Eben P. Dorr, care of Society of Natural Science, Buffalo, N. Y.

C. L. MARLATT, Secretary.

U. S. Department of Agriculture, Washington, D. C.

BOOK NOTICE.

MONOGRAPH OF THE BOMBYCINE MOTHS OF AMERICA NORTH OF MEXICO, including their transformations and origin of the larval markings and armature. Part I., family 1, Notodontidæ. By ALPHEUS S. PACKARD. National Academy of Sciences, Vol. VII., 1895 (received May 11th, 1896); 292 pages, 49 plates, and 10 maps.

Dr. Packard's long-promised monograph has at length appeared. The copious text is divided into ten sections: I., Introduction; II., Hints on the mode of evolution of the bristles, spines and tubercles of Notodontian and other caterpillars; III., On certain points in the external anatomy of Bombycine larvæ; IV., On the incongruence between the larval and adult characters of Notodontians; V., Inheritance of characters acquired during the lifetime of Lepidopterous larvæ; VI., Geographical distribution of the American Notodontidæ; VII., Phylogeny of the Lepidoptera; VIII., Attempt at a new classification of the Lepidoptera; IX., A rational nomenclature of the veins of the wings of insects, especially of the Lepidoptera; X., Systematic revision of the Notodontidæ, with special reference to their transformations.

Most of these have previously appeared as separate articles, as the reader will recall. The life-histories are given as fully as our present knowledge will allow, much of this knowledge being due to Dr. Packard's own labours. The plates illustrating them are beautifully coloured, the early stages highly magnified. These plates must be seen to be appreciated.

A few remarks in criticism of the memoir will not be understood to imply a lack of appreciation of its many valuable features. In general the synoptic tables of subfamilies, genera, and species are poor and uncritical. They are no improvement over those of the author's monograph of Geometridæ, to which the same criticism applies. In all the figures of larvæ the setæ are imperfectly shown, and their number and position are not to be relied upon. I corrected for Dr. Packard a number of the plates in this respect, but the corrections were necessarily made from memory and on general principles, and there is not a figure which has the authority of a careful copy from nature. Even the special figures in the text are often very erroneous; e. g., figure 9, on page 63, where the back and side views of the same larva are shown as different. Dr. Packard also fails generally to describe the arrangement of the setæ in the text.

The classification of the Lepidoptera which is used is original with the author. It has been already presented in the *American Naturalist*, where I have had occasion to notice it. In rejecting the classification of Prof. Comstock, the author argues that the frenulum is of small value in classification, because both frenulum and jugum are present in some Jugatae, and the frenulum is absent in some Frenatæ. While we may admit this argument for what it is worth, it seems that Dr. Packard entirely misses the great cumulative force of the evidence adduced by Prof. Comstock and others for these suborders. Classifications founded on the venation alone [Hampson], the wing scales [Kellogg], and the antennæ [Bodine] give the same suborders. I have also shown that the larval characters do not support Dr. Packard's view. But Dr. Packard gives no weight to larval characters, in spite of the implication in the title.

HARRISON G. DYAR.

NOTES.

COLIAS CÆSONIA.—Messrs. C. T. Hills and C. H. Tyris captured no less than fifteen specimens of this Southern butterfly (Fig. 20) on the 11th of June, besides worn specimens that they let go. "They were flying quite abundantly, mostly in a south-easterly direction, crossing the Humber River near Toronto, where the Canadian Pacific Railway bridge is." One specimen was also taken by them on June 14, near Little York. This butterfly has only once before been recorded from Ontario, having been taken on Long Point, Lake Erie.



Fig. 20.

PAPILIO AJAX.—At the end of May, and again on the 18th of June, a single specimen of this butterfly was seen at Port Hope, Ont. It has never before been observed so far east in this Province. In Toronto four specimens have been seen by Mr. C. T. Hills during the month of June this year.

Mailed July 6th.

The Canadian Entomologist.

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No. 8.

NEW BEES OF THE GENERA XENOGLOSSA AND PODALIRIUS (ANTHOPHORA).

BY T. D. A. COCKERELL, MESILLA, NEW MEXICO.

Xenoglossa patricia, n. sp.—♂. Length about 22 mm., very stoutly built; head and thorax black, densely covered with short fulvous pubescence; abdomen and legs bright chestnut red. Head broad, eyes black, orbits somewhat converging above, ocelli very large, a linear groove descending from middle ocellus, vertex obscurely tessellate; clypeus broad, yellow, its upper margin suffused with orange, and its anterior margin narrowly rufous; surface of clypeus rough so as to look like the skin of a lemon; labrum yellow, with appressed, very short, pale fulvous pubescence; mandibles long, simple, with a large yellow patch near the base, suffused outwardly into a reddish tongue, which gradually loses itself in the black of the tips. Antennæ hardly reaching beyond tegulæ, piceous, with the scape, funicle, and first and last joints of flagellum, rufescent. First joint of flagellum longer than the two following, but not so long as the three following. Sculpture of thorax cannot be seen for the pubescence. Tegulæ reddish-testaceous. Wings smoky, nervures piceous, venation as in *X. fulva*. Legs with appressed orange-rufous pubescence, spurs rufous, claws black at ends, strongly bifid, spur of anterior tibia with a broad hyaline wing, as is also the case with *X. fulva*. Abdomen moderately shining, with small, close punctures; first segment with fulvous pubescence at base, the rest bare, but for the fine reddish-fulvous pile, conspicuous when the abdomen is viewed from the side. Ventral segments fringed with reddish-fulvous hairs. Apex produced, black at the broadly truncate end; the apex is more produced and much narrower than in *X. fulva*. Sixth segment with a broad blunt tooth on each side.

Habitat.—Mesilla, New Mexico. At about a quarter to nine on the morning of June 21, 1896, the day being very hot and rather cloudy. I opened, in the town of Mesilla, a number of flowers of *Cucurbita perennis*. The flowers contained great numbers of *Diabrotica 12-*

punctata, but, in addition, each fresh flower contained a single bee. On sorting out the bees after returning home, I was astonished to find they were all of the genus *Xenoglossa*, and included three species, viz.: *X. pruinosa*, Say, 4 ♂; *X. patricia*, n. sp., 1 ♂; *X. cucurbitarum*, n. sp., 3 ♂. *X. patricia* is nearest to *X. fulva*, but it is larger and stouter, and the head and thorax are black. It has no resemblance to any of the other species. Smith's *Melissodes rubricata*, from Oajaca, Mexico, is coloured much like *X. patricia*; may it perhaps be a *Xenoglossa*? It differs from *patricia* by the black pubescence on the legs, etc.

Xenoglossa cucurbitarum, n. sp.—♂. Length about 20 mm.; not so stout as *X. patricia*; black, thorax covered with short orange-fulvous pubescence, legs bright chestnut-red. Head broad, orbits nearly parallel, eyes black; face, cheeks and occiput with rather thin pubescence, long and fulvous on occiput, becoming whitish on cheeks and lower part of face. Vertex more or less punctured, the punctures running into linear grooves on the front. A shining channel descending from middle ocellus. Clypeus closely punctured, lemon-yellow, with its whole upper margin and extreme sides rather broadly black, anterior edge rufous, simple. Labrum yellow, with pubescence as in *patricia*. Mandibles with a large yellow patch, the outer end of which becomes rufous. There is a large, short tooth on the inner side of the mandibles, not far from the base;—this is wanting in *patricia*. Antennæ reaching only to tegulæ, piceous, scape and flagellum dark rufous; first joint of flagellum a little longer than the two following together. Tegulæ reddish-testaceous. Wings smoky, nervures piceous, venation as in *patricia*. Legs with short reddish-fulvous pubescence, spurs rufous, claws black at ends, strongly bifid. Abdomen black, shining, punctured, base of first segment with fulvous hairs; second segment at sides, and the other segments all over, more or less covered with very short, appressed, fulvous pile. Apex produced and truncate, much as in *patricia*. Sixth segment with a tooth on each side.

Habitat.—Mesilla, N. M., as described above.

The following table will serve to separate the species of *Xenoglossa*:—

Legs, except the tarsi, black.

Flagellum ferruginous or testaceous, at least beneath; ♂ with a transverse yellow band on clypeus *ipomæa*, Rob.

Flagellum black, or nearly so; ♂ with a yellow spot on clypeus, sometimes wanting; ♂ with first joint of flagellum very short *pruinosa*, Say.

Legs wholly rufous, or fulvous; ♂ with first joint of flagellum long.

Head and thorax fulvous.....*fulva*, Smith.

Head and thorax black.

Abdomen chestnut-red.....*patricia*, Ckll.

Abdomen black.....*cucurbitarum*, Ckll.

X. pruinosa, I have from Pennsylvania and New York; thence to Mesilla is a wide range. *X. fulva* ranges from Lower California to Arizona and southward to Puebla, Mexico; its range seems not to touch that of *pruinosa*. *X. ipomææ* is only known from Carlinville, Illinois, where Mr. Robertson found it and *X. pruinosa* visiting *Ipomæa pandurata*.

The above was written June 21. On June 22, at about 7:45 a. m., the flowers of *C. perennis* were open, and about twenty minutes collecting yielded: *X. pruinosa*, 5 ♂; *X. patricia*, 2 ♂, 1 ♀; *X. cucurbitarum*, 4 ♂, 4 ♀. The honey bees were also visiting the flowers, but seemed disconcerted to find fat *Xenoglossæ* at the bottom of them. In one flower was found an *Agapostemon texanus*, which, it may be remarked, is not so blue with us as Cresson's Texan types, though otherwise agreeing.

The females of *X. patricia* and *X. cucurbitarum* resemble the males in size and appearance; the scopa of the hind legs is fairly abundant, but loose; it is distinctly plumose. In both, the rufous hind tibiae, on the outer surface, exhibit many small black spots. The legs of *cucurbitarum* ♀ are suffused with black at the base, to a variable extent. In *patricia* ♀ the clypeus and labrum are rufous, the mandibles are rufous without at base, and present a reddish-orange streak on the distal half, this being separated from the rufous by black. In *cucurbitarum* ♀ the clypeus is black, with sometimes an obscure reddish or yellowish spot near the anterior edge, its outline not clearly defined; the labrum also is black, reddish at its upper median border; the mandibles have an obscure yellow spot near the base, and sometimes a streak as in *patricia*. The hairs surrounding the pygidium in both species are bright orange-fulvous.

Podalirius cleomis, n. sp.—♂. Length, 12 mm., stout, black. Head broad, with long but not very dense pubescence, gray and black mixed, hairs on cheeks beneath long and white. Clypeus (except broad black lateral borders), a narrow supra-clypeal band interrupted in middle, triangular lateral face-marks, labrum (except a black boss on each side next to upper margin), and a large patch on outside of mandibles, pure white.

When the face is viewed somewhat from below, it is seen that the anterior margins of both clypeus and labrum (which has a small notch) are black. Antennæ black, the scape white in front. The lateral face-marks are divided above by a broad rounded notch into a linear portion extending a little way along the orbital margin, and a broad rounded portion adjacent to the clypeus. Clypeus and labrum punctured, disc of labrum somewhat confluent punctured. Sides of vertex with very small, close punctures; large, scattered punctures behind the ocelli, which are pale honey colour. Thorax densely covered with mixed gray and black pubescence, the sides with little black. Tegulæ black. Wings rather short, hyaline tinged with smoky, nervures and stigma piceous. Legs black, the joints of the tarsi after the first dark ferruginous. First four femora fringed behind with long white hairs. Middle tarsi simple. Hind tibiæ stout, with a long, obliquely-placed spine a short distance from the end. The hind femora are also quite stout, but not so stout as the tibiæ. First joint of hind tarsi broadened, with a conspicuous erect tooth not far from the base. Hind tibiæ with short grayish pubescence, appearing white in some lights. Inner surface of first joint of hind tarsi with short orange-rufous pubescence. Abdomen short and broad, first segment with sparse long grayish hairs, the remaining segments almost nude, the margins of segments 1-6 broadly cream colour or pale yellowish—this colour sharply defined from the black. Apex with two short, widely-separated spines, and short rufescent hairs.

Habitat.—Santa Fé, N. M., August, on *Cleome serrulata*. (Ckll., 1767.) This species is interesting as representing apparently a northward extension of a neotropical type. It resembles the *P. marginatus* (Smith), which Cresson says is found at Orizaba, Mexico; and still more the Mexican *P. tarsatus* (Sichel MS., Dours), from which it differs in the lack of fulvous pubescence, and the white instead of yellow face-marks. Dours says the basal joint of the hind tarsus of *tarsatus* has two spines; in *cleomis* the tibial spur crosses the tarsal spine and, projecting beyond, looks like a second spine. Could Dours have been misled by such an appearance? Dalla Torre, it may be remarked, has proposed to change the name *tarsatus* to *Doursii*, because of preoccupation; but the change is not needed if *Habropoda* be held valid, the other *tarsatus* being of that genus.

Among the U. S. species, *cleomis* resembles *P. californicus* (Cr.) and *P. texanus* (Cr.). From the former it is distinguished by the large

admixture of black in the pubescence, and from the latter by the colour of the pubescence and the black tegulæ. Cresson describes only the ♀ of *texasus*.

Besides the type specimen of *cleomis*, I have two others taken at Santa Fé, in August, by V. Boyle. It may be added that *P. cleomis* shows a considerable superficial resemblance to the European *P. albigenus*, Lep., which I have from Marseilles [E. André], but in *albigenus* the abdominal bands are due to pubescence, as in *alamosanus*.

Podalirius alamosanus, n. sp.—♀. Length about 14 mm.; anterior wing, 9 mm.; stout, black, with cinereous pubescence. Head broad, densely pubescent, except on lower part of clypeus and sides of vertex, which are bare; the pubescence cinereous, becoming tinged with ochraceous and mixed with black on occiput and middle of vertex. Face wholly black. Vertex roughened, and with sparse, indistinct punctures; clypeus rough from dense confluent punctures. First joint of flagellum as long as the second, third and fourth together, second shorter than third. Thorax densely covered with ashy pubescence, becoming dull white beneath, tinged with ochreous and mixed with black (especially on scutellum) on dorsum. Tegulæ fuscous, hairy on anterior half. Wings smoky-hyaline, nervures and stigma piceous, venation normal. Legs black with cinereous pubescence, apical joints of tarsi rufous. Hind tibiæ with short black hairs on inner surface; basal joint of hind tarsi with dark chocolate or fuscous pubescence on inner surface, and a black brush at tip. Abdomen black, the exposed parts with obscure sparse black pubescence; the whole of the first segment, and broad apical margins of segments 2 to 4, covered with very pale ochraceous hairs. Fifth segment with black pubescence, and a patch of pale ochraceous hairs on each side. Ends of ventral segments with pale hairs.

Habitat.—Cañada Alamosa, New Mexico, June 18 [C. H. T. Townsend]. The light abdominal hair-bands are very conspicuous and nearly uniform in width. This species seems to be quite closely allied to *P. mexicanus* (Sichel MS., Dours), but that is larger (17 mm.) and has the pubescence fulvous. Unfortunately, Dours's short description of *mexicanus* contains no reference to the hind tarsi, 5th abdominal segment, etc. The locality of *mexicanus* is vaguely given as Mexico, but the types came from de Saussure, and were probably collected by him on the tableland.

Podalirius vallorum, n. sp.—♂. Length, 12 mm.; anterior wing, 8 mm.; fairly stout, black, head and thorax with dense pale fulvous

pubescence, becoming white on cheeks beneath and lower part of pleura; a very few black hairs on dorsum of thorax. Head broad; vertex shiny, somewhat roughened, sparsely punctured; clypeus rather sparsely punctured. Clypeus (except the narrow anterior margin and a sutural mark on each side above), a supraclypeal band, lateral face-marks, labrum (except the usual pair of spots), a large patch on mandibles, and the scape in front, all lemon-yellow. First joint of flagellum longer than second, and a little longer than third, but not so long as $2 + 3$. Antennæ reaching a little beyond tegulæ. Tegulæ reddish-testaceous. Wings perfectly hyaline, nervures piceous. Second submarginal cell narrowed fully one-half above. Legs black, claws ferruginous at base. First four femora with long white hairs behind, hind femora with shorter black hairs. All the tibiæ with appressed pale mouse-gray pubescence on outer side, the four hindmost with black hairs on inner surface. Hind tibiæ somewhat dilated, and bearing a sharp tooth near the end, close to the origin of the spurs. Pubescence of basal joint of tarsi as described for tibiæ; basal joint of hind tarsi dilated, flattened, with a short tooth at the side. Intermediate tarsi simple and ordinary. Basal segment of abdomen with long pale ochraceous hairs; the remaining segments with thin, appressed, grayish-white pile on their hindmost halves, not forming bands. Hind margins of segments narrowly hyaline. Extreme apex with black hairs. The eyes in life are of a beautiful dark green.

♀. Similiar, but the pubescence more cinereous, and on occiput and the whole dorsum of thorax strongly mixed with black. Face and antennæ wholly black, mandibles with a pale line. First joint of flagellum about or almost as long as $2 + 3 + 4$. Middle of 5th abdominal segment with black hairs, sides with white hairs. Basal joint of hind tarsi with a conspicuous black brush. Wings perfectly clear as in the ♂.

Habitat.—Common at Mesilla and Las Cruces, New Mexico. I first took this species on *Solanum elaeagnifolium*, at Las Cruces, July 13, 1893 [Ckll., 313]. The specimen, a ♀, was identified by Mr. Fox as *urbana* of Cresson. Later, I found both sexes at Las Cruces, visiting the flowers of *Ipomœa*. At Mesilla, in the fourth week of June, the species was observed in great numbers, nesting in adobe walls. Up to the present day (June 23) I had no doubt that the insect was really *urbana*, but on more particularly examining a ♂, it was at once evident that it was a distinct species, and further study indicated that it was new. As in the fly-genus *Dolichopus*, this section of *Podalirius* presents us with a

series of females only with great difficulty to be distinguished, but accompanied by males presenting remarkable differences in the armature and clothing of the legs. The females of *P. lesquerellæ*, Ckll., ined., are very like those of *P. vallorum*, but are somewhat larger, have rather shorter antennæ, and fly earlier in the year—in April. But the males of *lesquerellæ* present a remarkable broad brush of black hairs on the last joint of the middle tarsi, while the basal joint of the hind tarsus is ordinary and unarmed.

The ♀ of *lesquerellæ* I have recognized in two specimens taken by Miss Jessie Casad: one at *Lycium* on the College Farm, Mesilla Valley, April 16; the other on cherry, at Mesilla, April 14. In size and general appearance it is like the ♂.

A NEW GRAIN BEETLE.

BY F. H. CHITTENDEN, WASHINGTON, D. C.

The recent discovery that the grain-feeding tenebrionid, *Palorus melinus* or *depressus* of American collections and literature, was in reality composed of two distinct species, as announced by the writer in the May number of *Entomological News* (Vol. VII., p. 138), finds a parallel in the recognition of *Silvanus mercator*, Fauvel, in local collections with *S. surinamensis*, Linn.

The former was not described until 1889 (see *Revue d'Entomologie*, Vol. VII., p. 132), and has hitherto been unrecognized in America, although M. Fauvel surmised that the species was cosmopolitan, from its relationship to *surinamensis*, et al., and its occurrence in France, New Caledonia, and Africa.

From examination of between two and three hundred specimens brought together mostly by myself, in connection with the investigation of insects affecting stored products, for the Division of Entomology of the U. S. Department of Agriculture, I am able to verify this opinion regarding its distribution. This material includes an example from Kaiffa, Syria, identified by one of our first European authorities, Mr. Edm. Reitter. At the Columbian Exposition I collected examples in exhibits of cereal and other seeds from Venezuela, Liberia, and Italy; from the Atlanta Exposition were also obtained specimens from Venezuela; and quite recently the species was received at the Department of Agriculture, in a lot of ground flaxseed, from Mr. H. G. Wolfgang, of Calla, Ohio. There are in the National Museum specimens from Los Angeles, Cal.,

and Astoria, Ills., and I have now living material from an unknown source, but taken at Washington, D. C. To this list of localities may be added Lower California and Arizona, from the collection of Mr. Henry Ulke, of this city.

The close relationship of *mercator* to *surinamensis* makes reasonably certain their virtual identity as regards development, nor is it probable that they differ in any degree in food habits.

The principal points of structural difference between these two species may be best expressed in tabular form, thus:—

| | |
|---|-----------------------|
| Tempora long, equal to about $\frac{2}{3}$ the diameter of the eye; ♂ with side margins of front strongly reflexed, and with trochanters large, terminating in a spine..... | <i>surinamensis</i> . |
| Tempora very small, tuberculiform, equal to about 1.5 the diameter of the eye; ♂ with side margins of front less prominent, trochanters unarmed..... | <i>mercator</i> . |

A third species, *S. bicornis*, Er., also strongly resembling *surinamensis*, and differing chiefly in having the side margins of the front developed into two conspicuous horns, has similar habits, and as it is apparently better known in Europe than *mercator*, may occur with us, though as yet I have been unable to discover it.

NOTE ON MAMESTRA COMIS.

BY A. RADCLIFFE GROTE, A. M.

This species is described by me in Bull. Buff. Soc., N. S., III., 85, not in the Geological Survey, as quoted in the Washington Catalogue. A comparison of the description proves that the insect before me could not have been *M. olivacea*. Its terms, both as to colour and markings, completely cover the description of *M. circumcincta*. There can, of course, be no reasonable doubt that the existing so-called "type" of *comis* is a specimen of *olivacea*, in which case the type label has been certainly transferred to another specimen after the type of *comis* was returned to Mr. Hy. Edwards. I do not remember that my type of *comis* was peculiarly set. The species was so much more vividly coloured that it did not even suggest to me *olivacea*, a species of which I possessed a long series.

MR. CARL F. BAKER spends most of the summer collecting in choice localities, up to 12,000 feet altitude, in the mountains of Northern Colorado. After October 1st, his address will be Auburn, Alabama, where he goes to fill the position of Entomologist in the A. and M. College.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XVIII. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC—(Continued).

TRIBE VIII.—CHRYSOMELINI.

Most of the members of this tribe are of at least moderate size, and are often quite ornately coloured. In form they are usually robust and convex, while lacking the rotundity of the Cryptocephalini. The genera of Eastern Canada may be arranged thus, the characters used being in the main drawn from the Leconte and Horn "Classification":—

- A. Anterior coxal cavities closed, metasternum long; reddish-yellow above, with black stripes. *Entomoscelis*.
- AA. Anterior coxal cavities open.
 - b. Claws simple, not toothed.
 - c. Tarsi with third joint entire or scarcely emarginate.
 - Prothorax not margined at base; species rather elongate, slightly convex, striped. *Prasocuris*.
 - Prothorax margined at base; species larger, more robust and convex.
 - Last joint of palpi truncate. *Doryphora*.
 - Last joint of palpi dilated. *Chrysomela*.
 - cc. Tarsi with third joint emarginate or bilobed.
 - Elytra spotted or spotted and striped. Prothorax with a thickened margin. *Lina*.
 - Elytra unicolorous, not spotted nor striped, except that the metallic gloss is sometimes intensified over longitudinal lines.
 - Elytra with regular punctured striæ. *Plagioderæ*.
 - Elytral punctuation dense and confused. *Gastroidea*.
 - bb. Claws toothed or bifid.
 - Tibiæ dilated and toothed near the tip. Species of oblong, rather convex form; yellow with black spots. *Goniocetena*.
 - Tibiæ slender, neither dilated nor toothed. *Phyllodecta*.

ENTOMOSCELIS, Chev.

E. adonidis, Fabr., is about .33 in. long, less robust than most of the Chrysomelini; the upper surface of the body dark reddish-yellow; the mouth-parts, sides of head, broad median stripe (and usually small lateral spot) on thorax, suture, and broad lateral stripe on elytra, black.

Antennæ, legs, and most of the under surface, excepting the sides of the prothorax, black. It is found both in America and Europe, and has here gained an additional importance through its destructiveness to turnips, radishes, and cabbages in the Western Provinces.

PRASOCURIS, Latr.

Elongate species of less convex form than usual, upper surface striped with yellow and brassy-green or bronze-black. The three species are thus separated by Mr. Crotch:—

Each elytron with two yellow vittæ not confluent at base. .24

in.....*phellandrii*, Linn.

Yellow vittæ of elytra confluent at base.

Legs black. .18-.22 in.....*obliquata*, Lec.

Tibiæ pale (= *varipes*, Lec.). .14-.18 in.....*vittata*, Oliv.

DORYPHORA, Ill.

Contains two large species of robust and convex form and bright colours. *D. decemlineata*, Say, the "Colorado potato-beetle," is almost too well-known to need a description—its yellowish colour, with black-spotted thorax and the five black stripes (the second and third of which are united at tip) on each elytron, rendering it easily recognizable. *D. clivicollis*, Kirby, is found on milkweed, and reaches a size of from .32 to .48 in. It is of a dark blue, the elytra orange-yellow, usually with three black spots on each, arranged thus: One on the humerus, one near the apex, and one on the suture, confluent with its fellow on the opposite elytron. The spots may all become confluent laterally, thus forming two broad blue bands, or, as in the variety *Rogersii*, Lec. (which is described as having the sides of the thorax nearly parallel behind), may become very much reduced in size and break up into numerous smaller ones.

CHRYSOMELA, Linn.

The species of this genus are more numerous and usually smaller than those of *Doryphora*, to which they bear a general resemblance. They are usually taken by sweeping. I find *C. exclamationis* on *Helianthus*, while *C. elegans* is occasionally abundant on willows. The following table will enable the Canadian species to be separated without much trouble:—

A. Elytra with tolerably regular stripes, never with numerous spots.

b. Front and side margins of prothorax pale, sometimes the base also.

- c. Each elytron with more than one vitta besides the sutural one.
First vitta free from the suture for its entire length, the fourth interrupted. .28-.30 in. *exclamationis*, Fabr.
First vitta uniting with the sutural, second and third confluent towards the apex, fourth much reduced. .22-.28 in. *conjuncta*, Rog.
- cc. Each elytron with broad sutural and one lateral vitta, thorax with black or dark brown discal mark of variable size, rarely reaching the base. .20-.25 in. *elegans*, Oliv.
- bb. Thorax unicolorous, brownish, more or less bronzed. Elytra with from one to three stripes besides the sutural.
- d. Last joint of palpi very large. .24-.32 in. *lunata*, Fabr.
- dd. Last joint of palpi moderate.
Claws approximate, form more oval. .21-.26 in. *suturalis*, Fabr.
Claws not approximate, form more oblong.
.24-.30 in. *similis*, Rog.
- AA. Elytra with irregular spots, forming more or less labyrinthine patterns; sometimes coalescent, but not forming regular stripes except close to the suture.
- e. Thorax green.
- f. Elytra with spots well separated.
Suture green, first vitta coalescent with it. .28-.40 in. (Fig. 21). *scalaris*, Lec.
Suture not green, first vitta free. .24-.35 in. *philadelphica*, Linn.
- ff. Elytral spots coalescent, forming a reticulate pattern. .30 in. *labyrinthica*, Stal.
- ee. Thorax either entirely pale or with front margin so; elytral spots very numerous.
.26-.35 in. *multipunctata*, Say.



FIG. 21.

The variety of *multipunctata* called *Bigshyana* by Kirby is distinguished by the large, dark basal thoracic spot. *C. spirea*, Say, is catalogued as a variety of *philadelphica*, and seems to form a link between that species and *scalaris*, since the sutural line is common and is joined to a shorter lateral one on each side near the base. An interesting paper on the group AA, by Mr. G. W. J. Angell, may be found in the first volume of "Entomologica Americana." His investigations go to show the extreme difficulty of sharply separating the species, though the majority of specimens will give no trouble in their identification.

LINA, Meg.

Two species are known from within our limits, both of them oblong insects of moderate size, less convex than *Chrysomela*. The under side of the body, the head above and a broad dorsal thoracic stripe with small lateral dot are usually black or greenish-black; the elytra, in cabinet specimens yellowish or sometimes slightly reddish with black spots. These spots, in *L. lapponica*, Linn., are rounded, or when confluent form transverse bands, while in *L. scripta*, Fabr., they are more elongate, even linear on the disc, and tend to form longitudinal vittæ. A form of *L. lapponica* in which the ground colour of the elytra is red is often found in spring on willows, sometimes mixed with the ordinary yellowish form; sometimes nearly the whole generation may be red, as is the case at Iowa City this year. *L. scripta* occurs chiefly on poplars and cottonwoods; a variety called *confluens*, by Rogers, has the elytra entirely dark except the outer margins; and a form with green elytra is mentioned by Mr. Crotch;—they may be distinguished, however, from the varieties of *lapponica* by having the claw-joint dentate. My specimens of *lapponica* range from .25 to .32 in., while *scripta* averages a little longer.

PLAGIODERA, Redt.

Oval insects of small size and green or blue colour, the upper surface convex, shining; elytra punctato-striate. I usually find them under boards in spring. Mr. Crotch thus separates the two from Canada:—

Elytral interstices finely punctulate, callus visible. .13-.17

in *cochlearia*, Gyll.

Elytral interstices subrugulose, no callus. .14-.16 in... *viridis*, Melsh.

The name *cochlearia* is replaced, in the third supplement of Henshaw's Check List, by *armoracia*, Linn.

GASTROIDEA, Hope.

Contains small species of oblong form, easily recognized by their resemblance to the common *G. polygoni*, Linn., so abundant on knot-grass. Following the arrangement of Mr. Crotch, they may be thus distinguished:—

Thorax and legs reddish; elytra green or blue..... *polygoni*, Linn.

Elytra golden, suture purple; thorax golden, usually purplish on edges..... *viridula*, DeG.

Blue or green, head flat, punctuation fine..... *cyanea*, Mels.

The name *viridula* replaces *formosa*, Say. All of the above are small insects, ranging from .16 to .20 inch in length.

GONIOCTENA, Redt.

G. pallida, Linn., is found on willows and poplars. It is .25 in. long, yellowish-testaceous, the top of the head and a thoracic spot of variable size (usually attaining the base) blackish. Under surface of body dark, especially towards the middle, tip of abdomen and sides of thoracic segments paler. Legs pale, elytra yellowish or reddish, occasionally nearly piceous, sometimes spotted with black, sometimes immaculate or with only a trace of the spots.

PHYLLODECTA, Kirby.

The Canadian species of *Phyllodecta* seems to be the same as the European *P. vulgatissima*, Linn. It is of oblong-ovate form, not very convex; bluish, greenish or bronzed; thorax distinctly, not very closely, punctured; elytra punctato-striate. Legs black; antennæ black, except the basal joints, which are more or less piceous or ferruginous. Length about .18 in. There are also existent records of *P. vitellina*, Linn., but no specimens have been seen by us, and Dr. Hamilton, to whom we wrote for further information, has expressed the opinion in a letter that all of the Eastern forms belong to the one species. Linnæus has described *vitellina* as being a shorter, less oblong form than *vulgatissima*. The descriptions of some of the older English writers probably confound more than one species, according to the word of Dr. Hamilton, who doubts the occurrence of the true *vitellina* in North America.

NOTES ON APHILANTHOPS AND DESCRIPTION OF A
NEW SPECIES.

BY S. N. DUNNING, HARTFORD, CONN.

Aphilanthops Bakeri, n. sp.

♂. Length, 8.5-10 mm.; of anterior wings, about 6-7 mm. Black with bright yellow markings. Head nearly quadrate, a little wider than high, closely and finely punctate. Eyes entire, elongate oval, inner margins parallel, inclined to light olive green. Ocelli in a triangle, the first a little larger than the last two, and located at the base of a slight cavity. A small cavity back and on the outer side of each of hind ocelli. Head covered with a sparse growth of long whitish pubescence, becoming thicker on face and back of eyes. Clypeus yellow and rounded, with two distinct lobes, each just inside of an imaginary line drawn straight down from base of antennæ, also a small but less distinct lobe between

these two, very slightly blackened between, and including lobes. Mandibles yellow outwardly, rufous tipped. A narrow curved yellow line just behind eyes. Sides of face yellow, same extending above base of antennæ on both sides and between. Overlapping base of mandibles is a small fringe of whitish hair. Scape of antennæ yellow-ringed at tip and below, above black, but yellow predominating. First joint flagellum, short, black, rounded, about one-third as long as second, which, with four following joints, is distinctly rufous below, and either rufous above or inclined to black; rest of antennæ black, except the rufous tip. Thorax black and covered with a sparse growth of whitish hair. Collar, sometimes spot below, tegulæ, tubercles and curved spot just back of tubercles, and a V-shaped mark below and a little back of this, transverse band on scutellum and post-scutellum, and spot on posterior lateral angles of metathorax, yellow. Mesothorax finely punctate, but not as closely so as head. When viewed from the side appears slightly ridged. Scutellum and post-scutellum rather more sparsely punctate. Metathorax with a slight rounded cavity. Abdomen black and banded with yellow; 1-6 segments each with a band, interrupted and slightly sinuose on first, either interrupted or narrowed on second and sixth, 3-5 narrowed in centre; terminal segment black, inclined to rufous at extreme tip; with a short growth of whitish hair, finely and closely punctate. First ventral either with or without a yellow spot and three or four yellow bands (growing smaller towards tip) on succeeding segments, the last band interrupted. Hind margin of first three or four segments above inclined to rufous. Legs yellow and black. Fore coxæ yellow tipped and yellow anteriorly, black posteriorly. Trochanters yellow tipped and yellow inwardly, outwardly black. Femora, first four-fifths outwardly black, rest yellow. Tibiæ yellow, with small dark spot inwardly and feebly spinose, slightly inclined to rufous at tip, as are all joints of tarsi except first, which is yellow. Middle and hind legs marked about the same, though either yellow or black may predominate on coxæ and trochanters. Wings inclined to dusky, nervures and stigma inclined to ferruginous, Marginal cell a little longer than first submarginal, appendiculate at apex. First submarginal about as long as the second and third combined on the cubital nervure, the second receiving recurrent nervure near centre, third receiving the nervure at end of first, fourth from second. Stigma with a light-coloured spot before.

Described from two male specimens belonging to Mr. Carl F. Baker

(after whom I have taken the liberty of naming this very pretty species), both from Colorado. [Baker, No. 1631 and 1636].

A. taurulus, Ckll.

A specimen which I have before me [Ckll., No. 4935, Las Cruces, N.M., ♂] differs from Mr. Cockerell's description as given in Trans. Am. Ent. Soc., XXII, p. 293, viz.: Bands on third and fourth segments distinctly separated instead of merely narrowed ventrals hold one band instead of three, and where the others should be are two very small yellow spots apiece. Middle tibiae are lemon-yellow without and rufous black within, instead of "yellow without and lemon within." Hind tibiae have first two-fifths all yellow and last three-fifths all black, and not "yellow without and black within, but wholly yellow at their proximal and wholly black at their distal ends." The sixth segment contains a small yellow dot.

A. 4-notatus, Ashm.

I have two ♂♂ before me. One from Colorado [Baker, No. 1631] and one from Montana, through the kindness of the Am. Ent. Soc. The yellow is a little brighter and more extended in the Colorado than in the Montana specimen, which has the third abdominal band separated, while in the Colorado specimen it is hardly narrowed. Mr. Ashmead's description says: "Mandibles yellow, tips black"; both of above have the yellow confined to base of mandibles, then rufous, and tips black.

A. Utahensis, Baker.

Through the kindness of Mr. Baker, I have had the type of this pretty little species for examination.

A. laticinctus, Cr.

Two males from Colorado were examined [Baker, Nos. 1631 and 1591].

A. frigidus, Sm.

Five ♀♀. Three from Hartford, Conn.; July 30th, two, and August 6th, one (1893). One from Chicago, Ill., July 31, '92, and one from Asbury Park, N. J., July 14, '93. Mr. Baker reports this from Colorado. One specimen shows no yellow on thorax, except band on collar. This was taken at Hartford, August 6th, 1893.

The above notes would tend to show that the abdominal bands are unreliable and vary greatly.

Our species may be separated as follows:

- A. Clypeus strongly tridentate, ground colour rufous throughout..... *Utahensis*, Baker.
- B. Clypeus not strongly tridentate, ground colour of at least head and thorax black.....
1. Last dorsal segment pointed, convex, legs yellow and black.
 - a. Bands of abdomen broad, continuous; clypeus yellow, size small..... *laticinctus*, Cr.
 - b. Bands, especially first three, narrow or interrupted, size larger.
 1. Clypeus face and antennæ black, except for two small yellow spots on face near base of mandibles..... *taurulus*, Ckll.
 2. Face with three broad yellow stripes, middle one shortest..... *frigidus*, Sm.
 3. Face all yellow..... *Bakeri*, Dun.
 2. Last abdominal segment rectangular and strongly concave, clypeus margined with yellow..... *4-notatus*, Ashm.

This table is Mr. Baker's, and is merely adapted to contain the new species. It was first published in CANADIAN ENTOMOLOGIST, XXVII., p. 335-6.

EXPERIMENTAL FARMS OF THE DOMINION OF CANADA.

The annual report of the Director and his assistants for the year 1895 is a goodly volume of over 400 pages, octavo, and is full of valuable and interesting matter. The portion contributed by Dr. Fletcher, the Entomologist and Botanist, contains notices of a large number of injurious insects that have attracted attention during the season in various parts of the Dominion, most of them being familiar pests. Among the less well-known insects referred to may be mentioned the "joint-worm," *Isosoma hordei*, Harris; the "cottony grass-scale," *Eriopeltis festuæ*, Fonsc.; the "cigar case-bearer," *Coleophora Fletcherella*, Fernald; the "peach bark-borer," *Phlæotribus liminaris*, Harris; the "black peach-aphis," *Aphis persicæ-niger*, Smith; the "New York plum-scale," *Lecanium cerasifex*, Fitch; and the "carrot-fly," *Psila rosæ*, Fab. The most injurious insects of the year appear to have been the grasshoppers of various species, which were excessively abundant in Ontario and the Eastern Provinces.

Dr. Fletcher includes in his report the experiments in bee-keeping carried on under his supervision at the Ottawa Farm, and closes with an account of some of the specially noxious weeds that are proving very troublesome in Manitoba and the Northwest. On the whole, we look upon this report as one of the most useful and interesting that our Dominion Entomologist has yet published.

INDEX TO THE MANTIDÆ OF NORTH AMERICA, NORTH OF MEXICO.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

In 1889, Westwood, in the Synopsis of the then known Mantidæ, prefixed to his *Revisio insectorum familiæ Mantidorum*, credits to North America, north of Mexico, nine species belonging to five genera,—Gonatista, Oligonyx, Thesprotia, Mantis, and Stagmomantis. Several species were overlooked by him, and in reality up to the present time twenty-three nominal species have been at different times credited to this region and referred to ten genera,—Ameles, Empusa, Phasmomantis, Stagmatoptera, and Theoclytes, besides the foregoing. Several of the species, however, have been erroneously credited to this country, such as *Empusa gongylodes* and *Mantis gemmata*, both of which are East Indian. Several of the names, moreover, are synonyms of others, so that the number of species these references represent is speedily reduced more than one-half. All of these but *Mantis Wheeleri* Thom., *Phasmomantis sumichrasti* Sauss., and *Oligonyx Uhleri* Stål, I have seen, and to them can add several more not before recognized in the region in question, six of them being apparently hitherto undescribed, together with one genus. The total number of species is fifteen or sixteen, and of genera, eleven, only three of the genera—Litaneutria, Stagmomantis, and Oligonyx—having more than one species; undoubtedly more forms will be found in the West and South.

The group is thus seen to be almost as poorly represented in temperate North America as the Phasmidæ [See CAN. ENT., XXVII., 29]. No species is known to occur in Canada, though a single species or two may possibly be looked for in Southern Ontario and in Assiniboia. The genera, with one exception, belong to the subfamily Mantinæ, and may be separated by the following table, largely adopted from those already given for these insects, by Stål, Bruner, and de Saussure. I add at the end a revision of the nomenclature of the described species, and a determination of the species figured by Glover.

TABLE OF THE GENERA.

A'. Upper surface of middle and hind femora and tibiæ rounded; head unarmed (MANTINÆ).

b'. Inner margin of upper surface of fore coxæ not conspicuously dilated apically.

- c¹. Pronotum but slightly longer than fore coxæ; eyes more or less conical; hind femora armed exteriorly with an apical spine.
- d¹. Eyes distinctly pointed (conico-acuminate) above; hind femora delicately incrassate basally, in the ♀ nearly twice as long as the pronotum; tegmina and wings abbreviate or wanting in both sexes; cerci long, distinctly surpassing the infragenital plate *Yersinia*.
- d². Eyes trigonal, scarcely pointed above; hind femora linear, in the ♀ but little longer than the pronotum; tegmina and wings fully developed in the ♂, abbreviate in the ♀; cerci short, not or scarcely surpassing the infragenital plate *Litanæutria*.
- c². Pronotum much longer than fore coxæ; eyes rotundate; hind femora with no apical spine.
- d¹. Antennæ filiform.
- e¹. Broadest portion of pronotum far in advance of the middle, the sides in front distinctly tapering; outer margin of fore femora armed with main spines only.
- f¹. Body of ♂ very elongate; anal membrane of tegmina violet *Phasmomantis*.
- f². Body of ♂ moderately elongate; anal membrane of tegmina light coloured.
- g¹. Anal and axillary veins of tegmina independent and simple throughout *Callimantis*.
- g². Anal and axillary veins of tegmina apically confluent *Stagmomantis*.
- e². Broadest portion of pronotum hardly in advance of the middle, the sides in front parallel or subparallel; outer margin of fore femora armed with numerous distinct spinules between the main spines. *Gonatista*.
- d². Antennæ incrassate beyond the base and thereafter tapering *Brunneria*.
- b². Inner margin of upper surface of fore coxæ abruptly and considerably dilated at apex.
- c¹. Fore tibiæ longer than their apical claw.

- d³. Fore and hind sections of pronotum subequal in length *Oligonyx*.
 d⁴. Hind section of pronotum twice as long as fore section *Bactromantis*.
 c⁵. Fore tibiae no longer than their apical claw *Thesprotia*.
 A⁶. Upper surface of middle and hind femora and tibiae carinate; middle of head with an erect process as long as the head (VATINÆ) *Theoclytes*.

SUBFAMILY MANTINÆ.

YERSINIA Saussure.

I know of but a single and undescribed species in the United States, of which I have specimens obtained by Morrison, in Colorado, on the plains at the base of the Rocky Mountains, and by myself at Garland, Costilla Co., Colorado, at a height of about 8,000 feet. Probably it is this species which Bruner found in Western Nebraska and referred (Publ. Nebr. Acad. Sci., 1893, 22) doubtfully to *Y. mexicana*. The species, which may be called *Y. solitaria*, is slenderer and slightly smaller than *Y. mexicana*, and is apterous in both sexes.

LITANEUTRIA Saussure.

The only species of this genus heretofore known as such was described from Sonora, but we have more than one species in the West. One is *L. minor* (*Stagmatoptera minor* Scudd.), figured by Glover (Ill. N. A. Ent., Orth., pl. 13, fig. 12), and of which I have seen specimens from Texas, New Mexico, Utah, Colorado, and Nebraska. It was originally described from the ♀ only. A very small ♀, apparently of this species, from Bridger Basin, Wyoming, is in the Museum of Comp. Zoology. Bruner has also sent me specimens from Arizona, California, and Kansas, and it is probably the "*Ameles* sp." mentioned by him (N. A. Fauna, VII., 266) as found in New Mexico, Arizona, California, Southern Idaho, and Middle Nevada. The undescribed "*Ameles borealis*" of Bruner (Publ. Nebr. Acad. Sci., 1893, 22), from Northern and North-western Nebraska, of which he has kindly shown me a pair of ♀'s, is perhaps distinct from it, with smoother pronotum. Another species, closely allied to this, differing indeed only, so far as I have seen, in the far greater depth of the fuliginous mottling of the wing of the male (both have the same large sub-basal fuligino-fuscous spot, seen also in *L. ocularis* Sauss.), is apparently undescribed, and occurs in Arizona, South-

ern California and Lower California; it may be called *L. obscura*. I have also females from Utah and New Mexico which may belong to either of the above. Still another species occurs in Northern California, in the Shasta region, in which the wings are feebly and uniformly fuliginous, having no sub-basal fuligino-fuscous spot; it may be called *L. pacifica*. In all of them the front border of the tegmina is griseo-pellucid, and thus different from the Sonoran *L. ocularis*; this last species comes nearest *L. minor*. The males in this genus are fully winged, the females brachypterous and of a very different appearance.

PHASMOMANTIS Saussure.

P. sumichrasti Sauss., a Mexican species, is reported by Saussure and Zehntner (Biol. Centr. Amer., Orth., 149) as found in Texas. I have seen no specimen of the genus from the United States.

CALLIMANTIS Stål.

I place in this genus a single species which differs considerably from the type, *C. antillarum* (Sauss.), in general livery and in lacking any apical spine to the hind femora. It is an undescribed species from Florida, a trifle smaller than *C. antillarum* and closely resembling a miniature *Stagmomantis carolina*. It may be called *C. floridana*. I have only seen the male, which was probably green in life, but is now uniformly testaceous, the tegmina hyaline, without stigma, the costal margin like the rest, and the first ulnar branch completely simple; the wings are hyaline, but are rather sparsely tessellate with fuscous in their posterior third, and the ulnar vein is simple; the proportions and general shape of the pronotum are those of *Stagm. carolina*, and, as there, it is unarmed; the anterior upper margin of the fore coxæ is armed with slight, distant spines, and the hind femora and tibiæ are tipped apically with fuscous. The expanse of the tegmina is 45 mm.

STAGMOMANTIS Saussure.

Of this genus I can recognize but two species, *T. carolina* (Linn.) and *S. limbata* (Hahn), readily distinguished by the great and uniform width of the costal field of the tegmina in the ♀ of the latter, where it is nearly one-third the entire width of the tegmina, and the green colour and opacity of the same field in the ♂. The former species is strongly dimorphic in the ♀, one form (*carolina*) having the tegmina strongly mottled with fuscous and the wings strongly fuliginous throughout, with a deep patch at the apex; the other (*dimidiata*), which is generally

classed as a distinct species, is entirely green, but with the posterior half of the wings sometimes strongly infuscated in the cells. As occurring in the United States, I do not see how the two forms can be specifically separated, as there are no similar distinctions in the very variable male, which is never green, but in which the tegmina may be wholly hyaline except along the costal margin, or they may be flecked with fuscous, or wholly suffused with fuliginous, while the wings vary from wholly hyaline to wholly fuliginous, with a tendency to a greater amount of fuliginous posteriorly. In some specimens from Las Cruces, N. Mex., the base of the wings is feebly violet. The species appears to be even more variable in Mexico, and the South American forms referred to *dimidiata* seem also to belong here. In the United States it is found (both forms indiscriminately) along the entire southern tier of States and territories from Florida to Arizona (Ft. Buchanan, south of Tucson, and Ft. Whipple, near Prescott), but I have neither seen nor heard of specimens from the Pacific Coast proper. From here it ranges north to Maryland, southern Illinois, Missouri, Kansas, and Utah, to judge from specimens seen by me. It is also reported from New Jersey [Smith], Pennsylvania [Westwood], Kentucky [Garman], and Nebraska [Bruner]. Saussure credits it to Cuba and Bolivar, accordingly, places it in the Cuban list, but says it does not exist in the Gundlach collection. On the other hand, I have received it from Gundlach under the number 30. It is also found at Key West. It is in the highest degree probable that Thomas's *Mantis Wheeleri* belongs to this species and probably to the form named *tolteca* by Saussure, which Saussure and Zehntner have separated as a distinct species. It seems to me rather a geographical race.

S. limbata (*viridimargo* and *cellularis* Burm.; *longipennis* Sauss.) has never been reported from the United States, but is found on our extreme Southern borders, as I have seen specimens taken at Matamoras, Mex., just over the border, on the Rio Grande; from the old Ringgold Barracks, on the lower Rio Grande [Schott]; an unspecified point in Texas, Schaupp [Henshaw]; Arizona, Morrison [Henshaw]; and Las Cruces, N. Mex. [Cockerell].

GONATISTA SAUSSURE.

We have a single species of this genus in the United States, *G. grisea* (Fabr.), which has many synonyms. It occurs in Cuba and San Domingo, and rarely in the Eastern United States, where it is probably an interloper. I have specimens from Key West and Fernandina, Fla., and from Georgia, and recently Mr. Blatchley sent me a specimen taken in Indiana. It was figured by Glover (pl. 16, figs. 13-15) as from Florida.

BRUNNERIA Saussure.

A single female specimen of this genus, remarkable for its peculiar antennæ, is in my collection, collected by Aaron on the Gulf Coast of Texas. It is distinct from the species heretofore described, all four of which come from S. America, the genus being unknown in Mexico and Central America. It may be called *B. borealis*. It is completely apterous, very elongate and slender, greenish with a ferruginous tinge which is predominant on the thorax; the antennæ, pallid at base, are pale ferruginous in the swollen portion, growing luteous beyond; the posterior part of the pronotum is three times as long as the anterior and is rather distinctly beaded with tubercles or blunt spinules along its lateral margins; the supra-anal plate is sublanceolate, much longer than its basal breadth, and the cerci slender, delicately tapering, about half as long as the fore femora. Length of body about 50 mm.; of antennæ about 12 mm. This specimen is doubtless immature, for a second, much larger, mature specimen from Texas, obtained by A. Agassiz, is in the Museum of Comp. Zoology. It has short and broad tegmina, reaching only the middle of the metanotum, and the body is 88 mm. long.

OLIGONYX Saussure.

Three species belonging to this genus, as latterly restricted, have been described from the United States: *O. Scudderi* Sauss., from Georgia; *O. Uhleri* Stål, from Louisiana; and *O. bollianus* Sauss.-Zehntn., from Texas and Northern Mexico. The first has also been credited, by Stål, to Texas, and is figured under this name by Glover (Ill. N. A. Ent., Orth., pl. 16, fig. 11, ♀), and as *Mantis missouriensis* Riley, by the same (Ibid., pl. 13, fig. 11, ♂). Whether these nominal species are distinct from one another I have not now sufficient means of deciding. *O. Scudderi*, though labelled as coming from Georgia, was originally thought by Saussure to really come from Central America, but he is now evidently of a different opinion, as it is not included in the *Biologia Centrali-Americana*. I have a specimen from Carolina which agrees with his description of *O. Scudderi*, and an immature specimen, apparently of this genus and about 6 mm. long, was found with others running about in a house in Waterville, N. Y., and sent to Mr. J. A. Lintner with enquiries. It proved to have probably hatched from eggs accidentally sent in the "moss" (*Usnea*) used in packing a barrel of oranges from Florida. So the genus occurs in the South-eastern States. My Carolina specimen is a trifle

stouter than numerous specimens from Texas (Boll, Belfrage, Lincecum), which altogether agree with *O. bollianus*, as do specimens sent me from Lincoln, Nebr., by Bruner, as *Mantis missouriensis*. I am therefore inclined to believe these two supposed species to be identical, and probably distinct from Stål's darker *O. Uhleri*, which I have not seen.

BACTROMANTIS (βάκτρον, Mantis), gen. nov.

Closely allied to *Oligonyx*, and, indeed, equivalent to the second division of that genus by Stål (Bihang K. Svensk. Akad. Handl., iv., No. 10, 67), to which he refers an unnamed species from Mexico. It comprises those species hitherto placed in *Oligonyx* (Stål, emend.) as have a very elongate instead of abbreviate pronotum, in which the hinder section is fully twice as long as the fore section. To it belongs only a single species from the United States, which may be called *B. virga* (possibly the species given in Westwood's Synopsis as *Thesprotia baculina* Bates MS., from Eastern Florida may be the same). I have only seen the apterous female; it is testaceous, the fore femora obscurely and narrowly banded with fuscous, the other legs greenish yellow; the apex of the femora broadly, the base and apex of the tibiae narrowly, infuscated. Length of body, 43 mm.; of pronotum, 15 mm. Sandford, Fla.; collected by Frazer.

THESPROTIA Stål.

We have a single species of this genus, *T. graminis*, named by Bates and described by me many years ago as an *Oligonyx*. I described only the ♂; the ♀ is apterous. It occurs in Florida, from Key West northward, and in Georgia.

SUBFAMILY VATINÆ.

THEOCLYTES Serville.

I here follow Saussure rather than Stål in restricting Serville's genus to his first subdivision, or what Serville at the outset terms *Theoclytes propriè dicta*. The only species known in the United States is *T. chlorophæa* (Blanch.), which occurs throughout Mexico, and is said to extend, says Saussure, to the United States as far as New York. It was originally described from Watertown, N. Y., but has since been recorded only from Central America, Mexico, and Louisiana. Saussure remarks that it probably does not extend northward beyond the Southern States. This seems altogether probable. The only specimen I possess comes from just over the Texan border at Matamoras.

Revision of the Nomenclature.

Ameles borealis Brun., Publ. Nebr. Acad. Sc., 1893, 22 = *Litaneura borealis*.

Ameles mexicana Brun., Ibid., 1893, 22 = *Yersinia solitaria*?

" sp., Brun., N. A. Fauna, vii., 266 (1893) = *Litaneura minor*.

Empusa chlorophæa Blanch., Hist. Nat. Ins., iii., 2 (1840) = *Theoclytes chlorophæa*.

Empusa gongylodes Westw., Drury's Ins., i., 122 (1837), East Indian.

Gonatista grisea Sauss., Mant. Amer., 23 (1871) = *Gonatista grisea*.

Mantis carolina Linn., Syst. Nat., Ed. 12, ii., 691 (1767) = *Stagmomantis carolina*.

Mantis chlorophæa Blanch., Mag. Zool., v., 135 (1835) = *Theoclytes chlorophæa*.

Mantis conspurcata Serv., Orth., 190 (1839) = *Stagmomantis carolina*, ♂.

Mantis ferox Sauss., Rev. Mag. Zool., 1859, 60 = *Stagmomantis carolina*.

Mantis gemmata Stoll', Spectres 71 (1787), East Indian.

" *gongylodes* Drury, Ill., i., 129 (1770), East Indian.

" *grisea* Fabr., Ent. Syst., ii., 20 (1793) = *Gonatista grisea*.

" *inquinata* Serv., Orth., 191 (1839) = *Stagmomantis carolina*.

Mantis missouriensis Riley, Glov., Ill. N. A. Ent., Orth., pl. 13, fig. 11 (1872) = *Oligonyx Scudderi*.

Mantis phryganoides Serv., Orth., 198 (1839) = *Gonatista grisea*.

Mantis Wheeleri Thom., Rep. Geol. Surv. 100th mer., v., 849 (1875) = *Stagmomantis carolina*?

Oligonyx bollianus Sauss.-Zehntn., Biol. Centr. Amer., Orth., 173 pl. 9, fig. 17 (1894) = *Oligonyx Scudderi*.

Oligonyx graminis Bates, Scudd., Proc. Bost. Soc. Nat. Hist., xix., 90 (1877) = *Thesprotia graminis*.

Oligonyx Scudderi Sauss., Mant. Amer., 121, pl. 2, fig. 24, 24a (1871) = *Oligonyx Scudderi*.

Oligonyx Uhleri Stål, Bih. K. Svensk. Akad. Handl., iv., No. 10, 66 (1877) = *Oligonyx Uhleri*.

Phasmomantis carolina Brun., Bull. Washb. Coll., i., 125 (1885) = *Stagmomantis carolina*.

Phasmomantis sumichrasti Sauss.-Zehntn., Biol. Centr. Amer., Orth., 149 (1894) = *Phasmomantis sumichrasti*.

- Pseudovates chlorophæa* Westw., Rev. Mant., 24 (1889) = *Theoclytes chlorophæa*.
Stagmatoptera minor Scudd., Rep. Geol. Surv. Nebr., 251 (1872) = *Litaneura minor*.
Stagmomantis carolina Sauss., Mant. Amer., 46 (1871) = *Stagmomantis carolina*.
Stagmomantis dimidiata Sauss., Ibid., 48 (1871) = *Stagmomantis carolina*.
Stagmomantis minor Sauss., Ibid., 54 (1871) = *Litaneura minor*.
Stagmomantis tolteca Sauss.-Zehntn., Biol. Centr. Amer., Orth., 143 (1894) = *Stagmomantis carolina*.
Theoclytes chlorophæa Serv., Orth., 153 (1839) = *Theoclytes chlorophæa*.
Thesprotia baculina Bates, Westw., Rev. Mant., 5 (1889) = *Bactromantis virgo*?

Explanation of the figures of Mantide

on the plates of Glover's Illustrations of N. A. Entomology, Orthoptera:—

Pl. 2. *Stagmomantis carolina* (Linn.).

Pl. 12, fig. 16. No name or locality is given; it probably does not come from the United States.

Pl. 13, fig. 11. *Oligonyx Scudderi* Sauss., ♂.

fig. 12. *Litaneura minor* (Scudd.), ♀.

Pl. 16, fig. 11. *Oligonyx Scudderi* Sauss., ♀.

fig. 13. *Gonatista grisea* (Fabr.), pupa.

fig. 14. " " ♀.

fig. 14a. " " ootheca.

fig. 14b. " " larva.

fig. 15. " " ♂.

A VARIETY OF *HEPIALUS ARGENTEO-MACULATUS*.

BY E. F. HEATH, "THE HERMITAGE," CARTWRIGHT, MANITOBA.

When Mr. Fletcher was looking over my cases of moths during the short visit he paid me last summer, he particularly noticed a series of *Hepialus argenteo-maculatus*, and suggested that a short description of a variety that I have taken here would be interesting.

This variety differs so much from the normal type that it might almost be a distinct species, but that is a point I cannot pretend to determine.

The ordinary specimens I have taken here measure from $3\frac{1}{4}$ to $3\frac{1}{2}$ inches across the expanded wing, but this variety only averages about 2 inches. The ground colour of the fore wings in the case of one female is almost white, with markings similar in pattern to those of the large variety, faintly outlined in greenish-brown; the wings are also rather more pointed than in the normal type. The hind wings are smoke-coloured, as are also the thorax and abdomen. In another specimen, a male, the fore wings are white with a slight shade of salmon colour, without any markings whatever; the hind wings are a shade or two darker, and the thorax and abdomen correspond in colour to the wings adjacent to them.

The habits of both varieties are very similar. I have taken both flying with their peculiar oscillating flight over low cherry scrub, or just on the verge of higher patches. It is a very curious sight to see several of these large moths performing their oscillations for several minutes over the same spot soon after sunset in the early summer—July; the flight being very rapid.

Here I believe the larva to feed upon both the wild black and red cherry, for I have once or twice shaken the pupa out of the roots of cherry scrub when digging some scrubby ground for a garden. I remember being much struck by the locomotive powers of one that I laid aside for a few minutes, and which managed to wriggle a considerable distance, comparatively, in a short space of time.

NOTE ON EUTOLYPE ELECTILIS.

BY A. RADCLIFFE GROTE, A.M., HILDESHEIM.

Prof. Roland Thaxter has sent me a specimen of what may be *E. electilis*, Morrison, and says: "The *Eutolype* is, as I suppose, *electilis*, and is subject to very great variation as to the depth and disposition of the darker shades and the clearness of the maculation, some being more or less obliterate and others on the plan of *Coelodasys biguttatus*, var. *cinereofrons*." This is the first specimen I have had, and I can only say it represents a species distinct from *Rolandi* or *depilis*. Unfortunately, the abdomen is missing, and I cannot say if it is tufted. The black dash described by Morrison is incomplete. I saw the type in the Tepper collection, but had no opportunity of comparing it with the others. It reminded me, on a very cursory examination, of *muralis*, but as all the species have the peculiar facies of the group, this comparison goes for

nothing. In my Bremen List I suggest the identity of *bombyciformis*, Sm., with *electilis*, and this, considering what Prof. Thaxter says of the variability of *electilis*, may prove to be the case. The two descriptions do not contradict essentially. On page 59 of his paper, Prof. Smith says: "I do not know where Morrison's type is to be found." On page 57 he says: "There is a badly-rubbed specimen, I believe in the Tepper collection marked 'type' by Mr. Morrison, in which the basal dash is broad and suffused; but I did not otherwise compare it with the description." I may ask why this specimen is not Morrison's type, since all other types in coll. Tepper are pronounced without doubt to be "the type"? With such a variable species as *electilis* evidently is, I cannot do more than suggest that Morrison's type be looked up by Prof. Smith. This type must be still in the Tepper collection, from which Prof. Smith has again had types only recently in working the *Hypeninae*. To have this matter cleared up would be a great help, as "*electilis*" is cumbering our lists without being positively applied to any species in the collections.

JOHN B. LEMBERT.

The tidings of the tragic death of "the Entomologist of the Yosemite," as he was locally called, was a great shock to his many correspondents. On the 19th of April last, a passing Indian found the body of Mr. Lemberg lying dead in his cabin, with a large bullet-hole in his head, over the right temple. He had evidently been murdered, as the cabin was found locked on the outside with a padlock. The crime is supposed to have been the work of some Indian whom he had offended, as he had no money or other valuables. From the condition of the body it was considered that the murder had been committed about the first of April.

Mr. Lemberg was a native of New York, but had lived for many years among the mountains of California. He owned a bit of land at the headquarters of the Tolumne River, at an altitude of 9,000 feet, and lived there like a hermit till his property was included in the Yosemite Park. As he wrote me last year, he then lost his home and was "shut out of making a living from the stockmen. Mr. Dyar came along like an angel unawares, and, at the age of fifty-one, he commenced to collect insects, having been living in the sight of nature continuously for twenty years." He occasionally acted as guide to parties visiting the mountains, and in this way made the acquaintance of Mr. Dyar, who in-

terested him in entomology, and taught him how to observe and collect. This was in 1891. He was, therefore, 56 years of age at the time of his death, though supposed to be a very much older man. He succeeded in collecting a number of rare species, and made many careful observations on the life habits of these and others, some of which have been published in this and other entomological magazines. The last time I heard from him was in February, when he sent me some specimens and a note on the preparatory stages of *Ardia virginalis*. His untimely death is a loss to entomology, as he was a keen observer and diligent collector in a little-known locality, and had only just begun a work which would have been of great value. He lived all alone among the mountains, and has left neither wife nor child to mourn his departure. C. J. S. B.

COLIAS CÆSONIA.—In our last issue the capture of this butterfly at Toronto was recorded. Mr. James Walker, of Orillia, Ont., writes: "I saw numbers of *Colias Cæsonia* flying over a clover field to-day (July 13th). I captured four, two of which were perfect. I had only liberty to walk on the edge of the field, or I might have been more successful. Mr. Grant has also captured five or six."

Mr. E. F. Heath writes, from Cartwright, Manitoba: "On June 19th I captured a rather worn specimen of *C. Cæsonia*. A few days subsequently I had a distant view of what I took to be another example. On July 10th I chased, but did not succeed in capturing, a fresh-looking specimen, and on the 15th was fortunate enough to take a very good one. I have since seen one or two more. It is not very easy of capture when assisted by a prairie breeze. This is the first time I have noticed the butterfly during a residence in the country of sixteen years."

LIBYTHEA BACHMANI.—Mr. McDonough captured a specimen east of Toronto, in 1895, and one in his garden in the city on the 7th of June last. The only previous Canadian records are Port Stanley, London and Hamilton.

THECLA SHERIDANI.—No less than fifteen specimens of this extremely rare butterfly were taken in the foothills west of Fort Collins, Colorado, at the end of April, by Professor Gillette, of the State Agricultural College, Fort Collins, and Mr. S. T. Mason, of Denver, Colorado.

Mailed August 1st.

The Canadian Entomologist.

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No. 9.

A HOUSE-INFESTING SPRING-TAIL

(*Lepidocyrtus americanus*, n. sp.).

BY C. L. MARLATT, WASHINGTON, D. C.



FIG. 22.—*Lepidocyrtus americanus*, n. sp.

a, lateral view of female; b, foot; c, tip of spring; d, scale; e, labrum;
f, mandibles; g, maxillae and labium (original).

In the course of a comprehensive study of insects frequenting dwellings, attention was early drawn to a very handsome little Collembolan, which occurs commonly in moist situations in houses in Washington. It may often be found on window-sills, especially if there is unusual moisture from the presence of window plants, or in bathrooms, and, in fact, wherever moist conditions prevail. This species is a very handsome one, and seems, from reference to the authorities, to be undescribed. From the manner of its holding the head, bent downwards almost at right-angles to the thorax, it would seem to fall into the genus *Lepidocyrtus*, erected by Sir John Lubbock. In habit it has in Europe a close ally in *Seira domestica*, Nicolet, which, as its name implies, is a frequenter of houses, and is separated generically from *Lepidocyrtus* by rather unimportant characters. Before referring to this insect in a popular article, it seems desirable to have a technical description put on record, and the following characterization of the species has therefore been prepared:—

Lepidocyrtus americanus, n. sp.

Length, 1.5 mm.; with spring unfolded above 2 mm.; head bent strongly downward, as in *L. curvicolis*, Lubbock; antennæ 4-jointed, more than one-half length of body; basal joint not much more than one-half length of others, which are subequal; abdomen with four segments, the third of which equals one-third length of body; legs tapering, with minute terminal tarsal joint; armed at apex with large spur, notched at tip and below, which is a strong simple spur or spine; spring more than half length of body, jointed at centre, the apical portion bifurcated; densely clothed with long fine hairs; terminal rays very finely and regularly comb-notched on lower or posterior edge and somewhat curved downward at tip, with three or four short, rather distinct, teeth at extreme tip; catch a strong groove or sheath extending one-third length of venter of abdomen and grasping spring strongly up to middle joint; body clothed with flat striate scales, and dorsally with scattering heavy, almost clubbed, hairs; the anterior margin of pronotum is ornamented with very dense tuft or fringe of strong hairs; hairs of antennæ and legs for the most part fine and long. Colour silvery gray, marked with violet-purple, lighter on antennæ and legs and very dark on body markings; eyes black; antennæ, except base of lower joints, femora and tibiæ, with spot connecting antennæ, light purple; anterior and lateral margins of thorax, spots along side of body, hind margin of second, third and fourth abdominal segments, lateral spot on middle of third segment, dark purple, sometimes appearing almost black.

One-third and one-half grown specimens do not differ from adult notably, except in size and very slightly in coloration. The illustration which is presented herewith is sufficiently elucidated in the accompanying explanation. In the figure the head is bent up more than in its normal position in state of rest. The mouthparts are very difficult to work out. The labrum is simple. The right and left mandibles differ notably in the character of the teeth on their inner edges. The maxillæ and labium are of similar structure, consisting of large basal lobes, apically covered with long and rather dense brushes of hairs. The food of the insect, from the appearance of the alimentary canal, consists of particles of dust, possibly taken by the insect in its feeding on the moist vegetable moulds of decay which may be assumed to be its normal food, in the absence of any other evident material on which it could subsist.

STILL ANOTHER APHILANTHOPS.

BY T. D. A. COCKERELL, MESILLA, NEW MEXICO.

Aphilanthops concinnulus, n. sp. — ♀. Length, 9 mm. Rufous, with white markings, a rather obscure broad black band extending across vertex, including most of the ocelli, its lower margin concave, mandibles darkened towards tips, mid and hind tarsi darkened. The white or yellowish-white marks consist of a small spot on each lower corner of face, a small obscure suffused spot on mandibles near base, the prothorax above, the tegulae except extreme base, the tubercles, a large patch behind tubercles having a linear oblique projection above, the anterior margin of scutellum, a spot on each side, the postscutellum, spots at the apices of anterior and hind femora, longitudinal bands on all the tibiae, a large patch on each side of the first three abdominal segments, a band on the fourth, a broad quadrate spot medially on the fifth. Venter immaculate. Face with the usual silvery appressed pile. General structure, wings, etc., as in *quadrinotatus*, but the third submarginal cell is much less produced at its apex, and the third at its base, than in *quadrinotatus*, this character, however, being liable to variation. The anterior tarsi present numerous gray spatulate hairs. The apex of the abdomen is of the same type as in *quadrinotatus*.

♂. Length, 8 mm. Black with white markings; the legs, the first segment of the abdomen, the second and sometimes the third more or less dorsally, the sides of the prothorax and greater part of metathorax sometimes, dark rufous. Markings as in ♀, except that the clypeus is yellowish-white, the anterior and middle femora have a white subapical patch behind, the abdomen above has five continuous bands, the second and third sometimes narrowly interrupted, the venter has three, white bands, interrupted in the middle. Apex of abdomen pointed. Scape dark rufous with a pale yellowish ring. Face densely covered with silvery pile. Clypeus (if the light portion wholly coincides with it) very low and broad, with a median lobe extending upwards; it is probable, however, that the sides of the clypeus above are dark. Anterior margin of clypeus with three very distinct, but small, teeth. A brush of yellowish hairs in front of each mandible at its base. Mandibles rufous, with a light spot at base, simple. Punctuation of vertex much closer than in *taurulus*. Nervures and stigma piceous or black.

Hab.—Several of both sexes, Rincon, New Mexico, July 5, visiting the flowers of *Chilopsis saligna*, Don. (Bignoniaceæ), in the river bed. One *A. taurulus* was taken with them.

I am convinced that these are the sexes of one species, but the ♂ and ♀ would come at opposite ends of Mr. Dunning's table (CAN. ENT., XXVIII, 206). The males known from North America, with three teeth on the anterior edge of the clypeus, may be separated thus:—

- (1.) Ground colour rufous. *utahensis*, Baker.
- (2.) Ground colour black.
 - (a.) Head and thorax densely hairy. *hispidus*, Fox (L. Cala.):
 - (b.) Head and thorax not unusually hairy. *concinulus*, Ckll.

The female of *concinulus* is smaller than *quadrinotatus*, and has not the black head and thorax.

NEW COCCIDÆ FROM MASSACHUSETTS AND NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, N. M.

In Europe and in New Zealand species of the genus *Rippersia* have been found, which lived in the nests of certain ants. It had always seemed to me singular that nothing of the kind should occur in this country; but Mr. G. B. King has proved that they merely wanted looking for, his researches in Massachusetts having led to the discovery of three species, here briefly described.

(1.) *Rippersia Kingii*, n. sp.—♀. About $1\frac{1}{2}$ mm. long, oval, legs and antennæ very pale yellowish; the natural colour of the insect could not be determined from the alcoholic specimens, but Mr. King states that when alive it is pink, shading into purple. Mentum (so-called) elongate, dimerous, with four bristles in a group at each side near the tip, and two on the sides further up, at considerable intervals. Antennæ fairly stout, 6-jointed: 6 much longest, and about as long as 3, 4 and 5 together. Formula 6 (21) (534). All with very sparse whorls of hairs, 6 with 3 whorls. Femur stout, with four bristles on its outer margin. Tibia a little shorter than femur, with four long bristles on outer margin and two on inner. Tarsus distinctly longer than tibia. Claw very long, sharp, not much curved. Digitules very inconspicuous, filiform, with very minute knobs. Anal ring with 6 moderately small hairs. Caudal tubercles low, scarcely developed, with several hairs like those of the anal ring. Dermis with very few short hairs. Antennæ about as far apart as the length of a femur.

Hab.—Dracot, Mass., April 14, 1896, with *Lasius flavus*, L., very abundant [G. B. King]. From the character of the legs, I think these specimens are only of the second stage, but in any event the species

seems quite distinct. Another lot, also from Dracot, April 20, 1895, "with *Lasius claviger*, Rog., and *L. flavus*, very common," presents no structural differences, though Mr. King gives the colour when alive as purple. A third lot, "with *Lasius claviger* and *L. flavus*, Lawrence, Mass., April 10, 1894, colour purple," also agrees with *R. Kingii*; but one specimen of this lot has the antennal formula 631 (245), 6 with only two whorls of hairs, and may represent another species. Another has the formula 63 (21) (54).

(2.) *Ripersia lasii*, n. sp.—♀. Small, elongate-oval, clear white when alive (as I learn from Mr. King); legs ordinary, rather slender; tibia slender at base, almost as long as femur, but only about half as thick; tarsus about two-thirds length of tibia; claw rather long, pointed, slender; tibia and tarsus each with three short bristles on inner side. Trochanteric bristle not very long. Mentum dimerous, three hairs on each side near tip. Digitules apparently absent. Antennæ 7-jointed: 7 longest, longer than 5+6, but not quite as long as 4+5+6; 2 next longest; 3, 4 and 6 subequal; 5 shortest, a very little broader than long. Joints with very sparse whorls of hairs: 7 with three whorls, 7 a little constricted about the beginning of its apical third. Another specimen has only 6-jointed antennæ, varying thus like the European *R. pulveraria*: 3 is almost as long as 6. Formula 6 (31) 254. Four is as broad as long. As in *pulveraria*, the third joint divides to make the 7 joints. The joints are more constricted at the sutures than in *pulveraria* as figured by Newstead.

From *R. Kingii* it differs by the narrower third joint of antennæ, the somewhat less tapering apical joint, the more slender tibia and tarsus, the tarsus less tapering to claw, the claw less curved, femur not so stout, tarsal hairs shorter, stronger, not so curved, mentum shorter in proportion to its length, legs rather brownish than yellowish.

Hab.—Methuen, Mass., June 17, 1896, with *Lasius americanus*, Em., not common [G. B. King]. Another lot is marked by Mr. King, "with *Lasius flavus*, L., Methuen, Mass., Oct. 10, 1894, colour clear white, not very common." This is, I think, certainly the second stage of *R. lasii*, and may be described thus: Very slightly over 1 mm. long, rather elongate-cylindrical, though not excessively so; legs quite large; femur fairly stout, but not so stout as in adult; tibiæ somewhat shorter than tarsi. Antennæ 6-jointed: 6 about as long as 3+4+5, but not so long as in the adult. Formula 63 (21) (54). This second stage may be

known from *Kingii* by the third joint of the antennæ being distinctly longer than the second, as well as by the quite different colour when alive.

(3.) *Ripersia flavicola*, n. sp.—♀. Rather slender, about $1\frac{1}{2}$ mm. long, colour about a light French yellow when alive (Mr. King informs me); antennæ slender, 6-jointed: 6 longest, a little longer than 4 + 5; 2, 3 and 4 subequal, 4 a little the shorter, but quite remarkably long, fully twice as long as broad; 1 next longest, then 5, which is a third longer than broad; 3 has a deep constriction at its distal third, so that it looks as if there were 7 joints, with a very small 4th, broader than long; 6 with three whorls of hairs. Legs slender, except femur, which is fairly stout. Tibia about as long as femur, tarsus about two-thirds length of tibia. Claw rather long, fairly stout, not much curved, with a small sub-basal tubercle on its inner side. Digitules apparently wanting. Mentum rather short, ordinary.

Another shows 7-jointed antennæ: 4 dividing into two, so we have 4, 5 and 6 all short and equal, or about so, 5 a little the shorter. This differs from 7-jointed *R. lasii* in being longer and slenderer, the sutures between the joints nearly flat for the most part, 6 much narrower, 2 and 3 longer, especially 2, which is at least twice as long as broad.

Hab.—Methuen, Mass., April 18, 1896, with *Lasius claviger*, Rog., not common [G. B. King]. Differs at once from *R. Tomlinii* by the antennæ; it is smaller than *R. corynephari*.

(4.) *Dactylopius prosopidis*, n. sp.—♀. Oval, about 2 mm. long, pale gray, varying to dark slate-gray and pale brownish-gray, with a sparse mealy covering, which is most dense along back and at sides, leaving fairly well-defined broad subdorsal bands of a somewhat darker colour, due not to pigment, but to the exposure of the body. No caudal or lateral cottony filaments, except in half-grown individuals, which show six short cottony caudal tufts.

The females live in subspherical masses on the twigs, after the fashion of *D. filamentosus*, and are attended by ants. The ♀ forms a dense cushion of white cottony matter, on which it rests; this cushion is visible all round the margin of the insect, and does not at first protrude greatly behind. In it are laid the very pale greenish-yellow eggs. Eventually the females become dark slate-gray, and have a cross of white secretion on the hind end. They at this period possess a Pulvinaria-like ovisac, projecting behind about as much as the length of a ♀, but thick, its height at the hind extremity of the ♀ being probably not less than the length of the ♀.

Boiled in caustic soda, they stain the fluid cochineal-red, and turn orange. Anal ring with the usual 6 hairs. Caudal tubercles very low, subobsolete, with setæ which are about twice as long as the hairs of the anal ring in the second stage, but not so long as this in the adult. Antennæ 8-jointed: 8 much longest, as long as $5+6+7$, which are subequal, but 5 the shorter; 4 shortest, broader than long; 3 and 2 equal. Formula 8 (32) 7 (61) 54. Legs ordinary, tarsus about $\frac{5}{8}$ to $\frac{3}{4}$ length of tibia, claw fairly large, digitules filiform, hardly knobbed.

Hab.—In the town of Mesilla, N. M., on Mesquite (*Prosopis*). I was astonished to come across this on some bushes I had passed many times. I have never seen it before on the numbers of Mesquite bushes I have examined in the vicinity. The eggs are produced at the latter part of July. This insect, in structure, particularly in the antennæ, closely resembles *D. solani*, var. *atriplicis*, which is probably a distinct species. Perhaps *prosopidis* and *atriplicis* may be forms of one species, but they seem distinct.

(5.) *Pulvinaria amygdali*, n. sp.—♀. Ochraceous, much wrinkled in drying; length of a boiled specimen under cover-glass hardly $2\frac{1}{2}$ mm., broad oval. Ovisac about 7 mm. long, pure white, convex, like that of *P. ribesiae*, not parallel-sided like *camellicola*, etc., nor adherent to anything that touches it, like *macluræ*, *innumerabilis*, etc.

Antennæ 8-jointed: 3 much longest, then 4, then 8 almost as long, 2 very little longer than 5; 6 and 7 subequal and shortest, 6 a little the shorter; 5 with two long bristles; 2 with a long hair at its end. Trochanter with a very long hair. Femur stout, more than twice as broad as tibia, with an erect hair on its inner side near the middle. Tibia and tarsus slender, tibia about as long as femur, tarsus hardly half as long as tibia. Claw short and curved, sharp. Tarsal digitules slender; those of claw tolerably stout, with oblique knobs, extending considerably beyond tip of claw. Marginal spines simple, slender, not numerous.

Prof. Tinsley, who was looking over the material with me, observed a specimen in which the third and fourth antennal joints were about equal.

Hab.—Abundant on a peach tree in Mr. Stanley's garden at Pinos Altos, N. M. (over 7,000 ft. alt.); found only on one tree. The antennæ are much like those of *P. persicæ*, Newst., but *amygdali* has the eighth joint decidedly longer. The knobs of the claw-digitules are larger and more oblique than in *persicæ*, and our insect is much smaller than Newstead's. The affinity of *amygdali* is clearly with *P. ribesiae*, Sign.,

but I have specimens of that, and it is clearly a different thing; the scale is dark-coloured. I do not suppose that *P. amygdali* was introduced into Pinos Altos on trees, but rather that it lives on some rosaceous shrub or tree in the mountains adjacent and has been carried to the peach tree on the feet of birds. This idea is favoured by the observation that it suffers severely from a Chalcidid parasite. The insect was discovered on July 8, 1896.

(6.) *Aulacaspis montanus*, n. sp.—♀. Scale circular to slightly oval, slightly convex, white, exuviae exposed, rather large, pale straw-yellow, first skin on second, but to its side. Diameter of scale little over 1 mm.

♀. When dry, brown-black, colourless after boiling in caustic soda. Mouthparts far anterior. Five groups of ventral glands, caudolateral and median groups compact, caudolaterals of 8, cephalolaterals 13, median 7. Median lobes wide apart at base, rounded, very low, their height above the margin less than half their breadth, their bases pointed, their colour slightly yellowish, not dark. Second and third lobes small, rounded, nearly obsolete. Plates small, spinelike. Anal orifice some distance from hind end, but caudad of the level of the caudolateral grouped glands. Margin with narrow sacs or saclike incisions, about as long as the greatest breadth of a median lobe.

♂. Scales in colonies, much as in *A. texensis*, brownish-white, distinctly 3-carinate, exuviae at one end, pale orange.

Hab.—Pinos Altos, N. M., July 8, 1896, on the trunk and limbs of *Quercus Wrightii*. It is evidently nearest to *A. texensis*, which lives on *Sophora* in Texas, but the median lobes are differently shaped and do not show the prominent serrations. The ♂ scales are not so white and have sharper keels than in *texensis*, but the ♀ scales are whiter and have the exuviae more contrasting with the scale.

I found four species of Coccidæ on the *Quercus Wrightii* at Pinos Altos, namely: *Aulacaspis montanus*, n. sp.; *Aspidiotus ancylus*, Putnam (evidently native); *Kermes galliformis*, Riley; and *Olliffiella cristicola*, Ckll., ined. The last is an extraordinary gall-making species, the type of a new genus of Idiococcinæ, the larva resembling *Crocodycta*; the adult, *Sphaerococcus*—Australian insects! The galls were abundant on the leaves.

I found at Pinos Altos two other species of oaks (*Q. Gambelii* and *Q. hypoleuca*), kindly identified for me by Mr. C. A. Keffer, but on neither of them did I observe any Coccidæ. Pinos Altos is the only locality in the Rocky Mountains where I have seen as many as three species of oaks growing on one hillside.

A SUMMARY OF THE MEMBERS OF THE GENUS
CHILOSIA, MEIG., IN NORTH AMERICA, WITH
DESCRIPTIONS OF NEW SPECIES.

BY W. D. HUNTER, ASSISTANT IN ENTOMOLOGY, UNIVERSITY OF NEBRASKA.

Chilosia signatiseta, n. sp.

Eyes bare, arista plumose, scutellum with long hairs on the margin, third antennal joint very large, bright yellowish-red. Legs black.

Male.—Front prominent, opaque, strongly sulcate medially, very indistinctly punctulate, long black pilose. Face shining black, pollinose on the sides and pilose on orbital margin below; below the antennæ deeply concave to the tip of the tubercle, thence gently concave to the epistoma. Tubercle projecting somewhat beyond the base of the third antennal joint, round. Cheeks shining, sparsely whitish pilose. Ocellar area black pilose. Eyes metallic. First antennal joint black, second dark reddish-brown, third bright yellowish-red, very large, subquadrate, with the lower outer corner rounded, upper corner obtusely pointed. Arista basal, black, incrassate, densely plumose. Dorsum of the thorax very lightly punctate, shining greenish-black, abundantly whitish pilose (viewed from in front) mixed with black in the middle, longer posteriorly. Scutellum lightly punctate, abundant long black pilose, with a few light hairs intermixed. Pleura abundant long whitish pilose. Abdomen with the sides almost parallel, short sparse yellowish pilose, more abundant on the sides, where it is intermixed with a few black hairs. First segment entirely opaque, second and third except on the lateral margins, fourth entirely, bright shining greenish. Legs black, all the knees reddish; pile in most reflections black; on the under side of all the tarsi and the anterior tibiae, golden in some reflections. Wings hyaline, veins dark brown, apical cross-vein almost straight, without stump. Length, $7\frac{1}{2}$ mm. Al., 7 mm.; 4-5 mm. wide.

Female.—Differs from the male in having the front shining and lighter pilose, the dorsum shorter pilose, the abdomen entirely shining, and the third antennal joint much larger; in this sex it is enormous—one and one-half times as large as in the male, but of the same shape.

Three specimens; Moscow, Idaho; Prof. J. M. Aldrich.

This species is closely allied to *C. Willistoni*, but is specifically quite distinct in the larger size and different shape of the third antennal joint, in the fact that the arista is densely plumose, while in that species it is loosely so, and that in the male the abdomen is largely opaque.

The third joint of the antennæ in *C. Willistoni* is small, subquadrate, and very much rounded at the tip; in the present it is very large, subquadrate, and obtusely pointed at the tip.

Chilosia cyanea, n. sp.

Eyes bare, arista plumose, scutellum with bristles on the margin, third antennal joint subquadrate, a little longer than broad, bright reddish-yellow. Legs black.

Female.—Shining blue. Front slightly sulcate medially, shining black, distinctly punctate, black pilose. Face shining black, not pilose, almost imperceptibly pollinose, deeply concave below the antennæ (so that in profile the concavity recedes to the eyes), tubercle rounded, obtuse, projecting about as far as the middle of the third antennal joint, below the tubercle almost straight (so that a line from the apex of the antennal callosity parallel to the posterior eye margin would coincide with the outline of the face below the tubercle). Cheeks shining black, nearly bare. First and second antennal joints black, second reddish at the apex. Third joint of medium size, a trifle longer than wide, subquadrate, with the lower outer angle rounded, light reddish-yellow, light pollinose in some reflections. Arista at the extreme base of the joint black, incrassate for about one-half of its length, long loose plumose. Occiput olivaceous, lightly pollinose, superiorly black and inferiorly white pilose. Thorax shining blue, finely punctate in front, more coarsely so posteriorly and on the scutellum, with very short black pile, lengthened into slender bristles on the sides posteriorly and on the border of the scutellum. Scutellum entirely shining blue, its pile and that of the adjacent dorsum yellow (viewed from in front). Pleura shining, with light-coloured pile. Abdomen broadly ovate, widest at the apex of the second segment, everywhere shining blue, less strongly punctured than the scutellum, with short white pile that when viewed from above appears to form narrow oblique bands, meeting at the middle of the anterior margin of the segments. Tarsi and legs, except the knees, black. Wings hyaline, much longer than the abdomen, tegulæ and veins testaceous. Posterior cross-vein slightly incurved, apical cross-vein straight, with outward stump at base and about one-third of its length above. Length, $7\frac{1}{2}$ mm. Al., 8 mm.

One specimen; Moscow, Idaho; Prof. J. M. Aldrich.

This species is closely related to *C. Willistoni*, but may be separated from that species by the general colour and by the colour of the third antennal joint.

Chilosia Aldrichi, n. sp. (Named after Prof. J. M. Aldrich.)

Eyes bare, arista scarcely pubescent, scutellum without bristles, legs black.

Female.—Shining black, almost bare. Front trisulcate, coarsely punctate, yellow pilose. Face shining on middle portion, powdered on the sides, between the lateral sutures and the eyes short pilose, below the antennæ deeply concave, below the tubercle slightly so. Tubercle round, projecting as far as the apex of the third antennal joint. Cheeks shining black, white pilose. Occiput shining olivaceous, light pilose. Ocellar area with a few black hairs. Antennal joints one and two black, third flattened, oval, slightly longer than broad, reddish-brown, darker above. Arista basal, almost bare, black, somewhat incrassate at base. Dorsum shining black, lightly punctate, very sparsely short yellow pilose, humeri dark. Pleura shining, pilose like the dorsum. Scutellum black, shining, more strongly punctate than the dorsum. Abdomen oval, widest at the apex of the second segment, everywhere shining black; black pubescent in the middle, and short white pilose at the sides anteriorly. Legs black; front pairs, including the coxæ on the under side and posterior tarsi at apex, very indistinctly golden pubescent. Wings subhyaline, indistinctly tinged on the basal half with brownish, long, rather slender, veins brown. Apical cross-vein without stump, except at the base. Tegulæ white. Length, 9 mm. Al., 8 mm.

Three specimens; Craig's Mt., Idaho; Prof. J. M. Aldrich.

The colour of the third antennal joint in this species varies from very dark reddish to almost black.

TABLE OF NORTH AMERICAN SPECIES OF CHILOSIA.

| | |
|---|--------------------------|
| 1. Eyes pilose..... | 2 |
| Eyes bare..... | 8 |
| 2. Legs black..... | <i>Aldrichi</i> , n. sp. |
| At least the tibiae more or less light-coloured..... | 3 |
| 3. Third joint of the antennæ light reddish-yellow or yellow..... | 4 |
| Third joint of the antennæ black or reddish-brown..... | 5 |
| 4. Abdomen shining (female), arista black..... | 25 |
| Abdomen largely opaque (female), arista brown..... | 28 |
| 5. Third antennal joint nearly square..... | 6 |
| Third antennal joint rounded..... | 7 |
| 6. Face in profile almost vertical below the antennæ, produced considerably below the eyes..... | <i>lasiophthalma</i> . |

- Face strongly concave below the antennæ.....*Baroni*.
7. Shining portion of the abdomen steel-blue; pile of the front light-coloured.....*chalybescens*.
Shining portion of the abdomen metallic-green; pile of front black.....*occidentalis*.
8. Legs black; at most, the knees lighter.....9
Tibiæ at least largely yellow.....14
9. Third antennal joint black.....27
Third antennal joint brown, yellow or reddish-yellow.....10
10. Arista plumose.....11
Arista bare.....13
11. Third antennal joint reddish-brown; arista loosely plumose; general colour blackish; antennæ moderate in size (female)....*Willistoni*.
Third antennal joint bright reddish-yellow.....12
12. Arista densely plumose; general colour blackish; dorsum of thorax (female) yellowish pilose; third antennal joint very large (female).....*signatiseta*, n. sp.
Arista loosely plumose; general colour blue; dorsum of the thorax (female) not black pilose, but black pubescent (viewed from in front).....*cyanea*, n. sp.
13. Third antennal joint reddish-brown or brown; rounded; tegulæ black ciliate; wings blackish in front.....*nigripennis*.
Third antennal joint reddish-yellow, subquadrate; tegulæ white ciliate; wings not blackish in front.....*versipellis*.
14. Scutellum without bristles or bristlelike hairs on the margin.....15
Scutellum with bristles or bristlelike hairs on the margin.....18
15. Posterior femora largely reddish, or at least so coloured at the base.....23
Posterior femora, except the tip, always black.....16
16. Abdomen entirely shining in both sexes.....*comosa*.
Abdomen, at least in the male, largely opaque.....17
17. Four anterior tibiæ entirely yellow; pile of front light-coloured.....*capillata*.
Four anterior tibiæ yellow only at apex and base; pile of front black.....*tarda*.
18. Arista briefly pubescent.....19
Arista plumose or long pilose.....20
19. Femora yellow.....*prima*.
Femora largely black or brown.....24

20. Third antennal joint quadrangular.....*Townsendi*.
 Third antennal joint rounded-ovate or ovate.....21
21. Abdomen in both sexes entirely shining.....26
 Abdomen of the male largely opaque.....22
22. Posterior femora on basal third, and at apex, yellow; scutellum
 yellow, except the narrow base.....*pallipes*.
 Posterior femora, except the apex, black; scutellum only piceous at
 apex; first posterior cell broader and last section of fourth longi-
 tudinal vein accordingly longer.....*tristis*.
23. Second abdominal segment partly opaque; four anterior tibiae
 entirely yellow.....*prima*.
 Abdomen entirely shining; four anterior tibiae with at least a dark
 band.....*parva*.
24. Pile of dorsum of thorax black, abundant.....*sorocula*.
 Pile of dorsum of thorax sparse, whitish or yellowish.....29
25. Thorax long pilose, third antennal joint moderate; arista
 pubescent.....*aurotecta*.
 Thorax short pilose.....27
26. Anterior femora largely black.....*cyanescens*.
 Anterior femora yellow.....*plumata*.
27. Scutellum with bristlelike hairs.....*lævis*.
 Scutellum destitute of such hairs.....*lucta*.
28. Scutellum with bristles.....*petulca*.
 Scutellum without bristles.....*sororia*.
29. Pile of the abdomen long, yellow.....*chalybescens*.
 Pile of the abdomen short.....*hoodiensis*.
30. Posterior femora light-coloured at base and apex; dorsum of thorax
 smooth.....*pallipes*.
 Posterior femora light-coloured only at the apex; dorsum of thorax
 roughened.....*leucoparea*.

CATALOGUE OF THE DESCRIBED NORTH AMERICAN SPECIES OF CHEILOSIA.

Cheilisia.Meigen; Syst. Besch. III., 296 (1822), *Cheilisia*.

Ibid., id., VII., 123 (1838).

Cartosyrphus, Bigot, Ann. Soc. Ent. Fr., 1883; 555. (Will.)

Melanogaster, Bigot, Ann. Soc. Ent. Fr., 1883; 258. (Pt.)

Syrphus and Eristalis ex parte, auctorum.

- Chilosia Aldrichi*, Hunter ante.
- Chilosia aurotectæ*, Giglio-Tos ; *Bulletino Mus. Zool. e. Anat. R. Univer.*, Torino ; Vol. VII., 132, p. 4. (1892). Orizaba, Mexico.
- Chilosia Baroni*, Willist., *Syn. N. A. Syrph.* 40. (1886). Cala., Washington State.
- Chilosia capillata*, Loew, *Centur. IV.*, 65, 1863.—O. S. Cat. N. A. Dipt., 1878, p. 121 ; *Will. Syn. N. A. Syrph.* 43. D. C.—Virginia. *Cartosyrphus lamprurus*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 552 (Will.)
- Chilosia chalybescens*, Will., *Kans. Uni., Quart. Vol. II., No. 2*, 1893. Cala.
- Chilosia chrysochlamys*, Will., *Biol. Cent. Am. Dipt.*, III., p. 8 (1891). Omilteme, Mexico, and Sierra de las Aguas Escondidas, Mex.
- Chilosia comosa*, Loew, *Cent. IV.*, 66, 1863.—O. S. Cat., 1878, 121., Will. *Syn. N. A. Syrph.* 44. Colo., English River; Winnipeg.
- Chilosia cyanea*, Hunter ante. Idaho.
- Chilosia cyanescens*, Loew, *Cent. IV.*, 66, 1863.—O. S. Cat., 1878, 121. Will. *Syn. N. A. Syrph.* 42. Conn.; New Hampshire ; Illinois.
- Chilosia hoodiensis*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 552 (*Cartosyrphus hoodianus*). Will. *Syn. N. A. Syrph. Appendix*, 292. Oregon.
- Chilosia lævis*, Bigot, *Ann. Soc. Ent. Fr.*, 1883, 552 (*Cartosyrphus*). Will. *Syn. N. A. Syrph. Ap.* 292. Washington State.
- Chilosia lasiophthalma*, Will., *Proc. Am. Phil. Soc. XX*, 306, 1882. Ibid. *Synopsis*, 40, 1886. Colorado.
- Chilosia leucoparea*, Loew, *Cent. IV.*, 69 —O. S. Cat. N. A. Dipt., 1878, 121 ; Will. *Syn. N. A. Syrphidæ*, 45. Carolina.
- Chilosia lucta*, Snow, *Kans. Uni., Quart. Vol. III.*, 228, April, 1895. Colorado.
- Chilosia nigripennis*, Will., *Proc. Am. Phil. Soc. XX*, 307 ; 1882. Oregon. *Cartosyrphus infumatus*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 553.
- Chilosia occidentalis*, Will., *Proc. Am. Phil. Soc. XX*, 305. Ibid. *Synopsis*, 41. California.
- Chilosia pallipes*, Loew, *Cent. IV.*, 70, 1863.—O. S. Cat. N. A. Dipt., 1878, 121. Will. *Synopsis*, 41, Ib. *Appendix*, 293. White Mts.; Washington, Cala.
- Chilosia parva*, Will., *Proc. Am. Phil. Soc. XX*, 307 ; 1883. Oregon. *Melanogaster ochripes*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 555. (Will.)
- Chilosia petulca*, Will., *Synopsis* 39, 1886. Snow, *Kans. Uni., Quart. Vol. III.*, 228. State of Washington ; Colorado.

- Chilosia plumata*, Loew, Cent. IV., 68, 1863.—O. S. Cat. N. A. Dipt., 1878, 121. Will. Synopsis, 42, 1886. Virginia.
- Chilosia prima*, Hunter, CAN. ENT. XXVIII., 92, 1896. Pennsylvania.
- Chilosia signatseta*, Hunter ante. Idaho.
- Chilosia sorocula*, Will., Biol. Cent. Am. Dipt. III., 1891. Snow, Kans. Uni., Quart. III., 228. Mexico: Omilteme, 8,000 feet; Xucumanatlan, 7,000 feet; Sierra de las Aguas Escondidas, 7,000 feet;—all in Guerrero, U. S., New Mexico.
- Chilosia sororia*, Will., Biol. Cent. Am. Dipt. III., 9, 1891. Mexico. Ciudad in Durango, 8,100 feet.
- Chilosia tarda*, Snow, Kans. Uni., Quart. Vol. III., 228. Colorado.
- Chilosia Townsendi*, Hunter, CAN. ENT., Vol. XXVIII., 94, 1896. California. *Chilosia* sp., ? Townsend, Dipt. Baja, Cala., in Proc. Cala. Acad. Sci. Series ii., Vol. 4, 611.
- Chilosia tristis*, Loew, Cent. IV., 71, 1863.—O. S. Cat. N. A. Dipt., 1878, 121. Will. Synopsis, 41. Red River. (Loew.)
- Chilosia versipellis*, Will., Synopsis 44. State of Washington.
- Chilosia Willistoni*, Snow, Kans. Uni., Quart. Vol. III., 227 (1895). Cala.; Col. This species was described as *C. lugubris* by Williston—Synopsis, p. 45, 1886. Snow has suggested the present name because "the name *lugubris* is preoccupied for a Swedish *Chilosia* by Zetterstedt." According to Herr T. H. Becker, Zetterstedt's species will not stand, as the types of that species are partly teneral forms of a well-known species of Meigen and partly mature specimens of other species. However, this does not affect the propriety of Mr. Snow's suggestion which I have adopted.

SPECIES NOT INCLUDED ABOVE.

- Chilosia frontosa*, Bigot, Ann. Soc. Ent. Fr., 1883, 552. Will. Synopsis, p. 46. Mexico.
- Chilosia rufipes*, Bigot, Ann. Soc. Ent. Fr., 1884, 555 (Melanogaster).

It is quite probable that this species is a *Chilosia*, from the fact that Mr. Bigot, in his table for the separation of the genera of Syrphidæ, distinguishes *Melanogaster* from *Cartosyrphus* by the fact that in the former genus, "Face, female, pourvue de sillons lateraux."

It will be impossible to recognize the species from the description, as the three very important characters—the bareness or pilosity of the eyes and arista, and the presence or absence of bristles on the scutellum—are entirely omitted.—North America (Bigot).

- Chilosia*, n. sp.? Snow, Kans. Uni., Quart. Vol. III., 229. Colorado.

A NEW PULEX FROM QUEEN CHARLOTTE ISLANDS.

C. F. BAKER, FORT COLLINS, COLO.

Pulex Keeni, n. sp.

Belonging to Division II., group two of the genus as given in my Preliminary Studies. Nearest *sciurorum*.

Head without combs of spines, in the female normal, highest at the occiput, gradually sloping forward, then rapidly curved in front, anterior edge of face nearly perpendicular, but rounded; head in male flat above or slightly concave, strongly rounded in front, the anterior edge of the face slightly receding. Bristles on head few, these being on both sides of the antennal groove and on the occiput. Antennal groove open, bristles on joint 2 short. Mandibles equalling or slightly exceeding the fore coxæ. Pronotal comb of twenty-two spines. Bristles on dorsal abdominal segments in two rows, the second of six to ten rather short bristles, on the ventral segments in single rows of usually six bristles. First three or four dorsal segments furnished on discs with two to six very short stout teeth. Leg spines rather weak except on the fore coxæ and all the tibiæ. Apical spines on joint 2 of hind tarsi much shorter than joint 3; two of the apical spines of middle tibiæ longer than first joint of tarsi. In fore tarsi joint 1 equals 2 and three-fourths of 5, 3 a little shorter than 5, and 4 little more than half of 5. In the middle tarsi joint 5 equals three-fourths of 2, 3 is one-half of 1 and nearly equals 5, and 5 is twice 4. In the hind tarsi joint 2 is two-thirds of 1, 1 is two and a half times 3, 2 equals 3 and 4 together, while 4 is one-half of 3, which is somewhat longer than 5. In the male the upper claspers are long, narrow, pedunculate, sides nearly parallel, anterior margin slightly angulated, apex rectangular and furnished at tip behind with a long, stout bristle, and on posterior edge with two short, stout, blunt black spines; the lower or posterior claspers differ widely from those of *sciurorum* in being short and suddenly broadened towards the tip. Colour light brown. Length: male, 2.5; female, 3 mm.

Described from several specimens taken on *Sitomys Keeni*, at Masset, Queen Charlotte Islands, in August of 1895, by Rev. J. H. Keen, to whom the species is dedicated. I am indebted to Dr. James Fletcher for the opportunity of examining this very interesting and well-marked form.

NOTES ON SAWFLY LARVÆ.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Trichiosoma triangulum, Kirby.

Two flies have emerged from cocoons which had passed two winters. Last summer I noticed an example of mistaken instinct. The eggs of this species are laid under the lower epidermis by saw-cuts in the edge of the leaf. Several eggs so laid were found on *Ilex verticillata*. In due time the larvæ hatched, but refused their food, and would undoubtedly have perished had I not recognized them and supplied them with willow, which they attacked voraciously.

Macrophya tibiator, Norton.

The description of the larva of this species in Harris's Correspondence, p. 369, is included in the first paragraph only. The remaining notes under the same heading refer to larvæ of *Harpiphorus varianus*.

M. tibiator has a variable number of stages, difficult to determine, much as in the case of *H. varianus*. I have mature larvæ with width of head 1.4, 2.2 or 2.5 mm. The following description is a little more definite than that of Harris, though his is excellent:—

Pale yellowish, thickly overspread with a fine mealy-white secretion, less abundant subventrally and on the legs, which consequently appear yellowish; venter without bloom; anal plate concolorous. On vertex of head a large defined black band ending in a rounded point above the clypeus; eye in a black spot. Segments 7-annulate; a row of small velvety black lateral spots, two per segment (on third and fifth annulets above the spiracle), the anterior spot the larger; only one spot on joints 3 and 4, none on joint 2, and only a trace of any on joint 13. Thoracic feet colourless, with a black mark at the extreme base. Abdominal feet on joints 6 to 13. The larvæ curl spirally like the *Cornus* larvæ. Sometimes the white secretion become slightly woolly, but never as in *H. varianus*. Head only slightly pruinose.

Ultimate stage.—Head shining, dull honey-yellow, finely shagreened, no marks; eye black. Body segments neatly 7-annulate, very shining, pale greenish-yellow, without marks or any white bloom except the dark spiracles and faint tar-brown shades in the folds. Thoracic feet colourless. The larvæ immediately enter the earth. Found on the elder (*Sambucus*) in VanCortlandt Park, New York, and also sent me by Mrs. Slosson, from Franconia, N. H.

Harpiphorus maculatus, Norton.

I think the last word has not been said in the controversy as to the identity of this form with *Monostegia ignota*. Mr. Mally apparently disposed of the question (*Insect Life*, III., 9) by showing that *M. ignota* had always four submarginal cells and came from a larva with immaculate head, whereas *H. maculatus* may have three or four submarginal cells, but comes from a larva with a black spotted head.

Now I have to record the breeding of two specimens of *H. maculatus* from larvæ with black spotted head (as required), but also two specimens of the same insect (three submarginal cells) from larvæ with immaculate head, on strawberry, and another specimen from a similar larva on raspberry.

These observations are contradictory to Mr. Mally's conclusions; but agree with the original contention of Mr. Harrington, that the species are identical. Another fact is in favour of Mr. Harrington's view. The larvæ of both forms are structurally and in habits those of *Harpiphorus* (or *Emphytus*), not *Monostegia*, *Eriocampa* or *Caliroa*. The two types are rather distinct.

Egg.—I have nothing to add to Mr. Mally's account.

Stage 1.—Head black or dark brown, with a black shade around the eye; width .25 to .3 mm. Body whitish, rather opaque, but the food showing by transparency; distinctly annulate, no marks. Thorax slightly enlarged. Rests with the body extended.

Stage 2.—Head pale brown, with or without traces of a vertical and lateral black patch; eye black; width .4 mm. Body all whitish, food showing; annulate, as before.

Stage 3.—Head pale brown or whitish-testaceous, shining, the eye black, immaculate or with the three black spots of the mature larva (black spotted variety); width .6 mm. Body whitish, not shining, about 6-annulate, no marks. The larva rests with the body curled.

Stage 4.—Head whitish to pale brown, as before; width .8 mm. Body whitish, like ground glass, only coloured by the food from within. Feet on joints 6 to 13; thorax a little larger than abdomen; head large in proportion.

Stage 5.—Head whitish or slightly brownish, immaculate, except for the black eye, with a trace of black shades or a dusky black cloud on the apex and a smoky darker patch behind and a little above the eye; width 1.0 to 1.15 mm. Body as in the next stage, but without the small points;

immaculate or with more or less distinct traces of a dusky lateral band ; rarely a faint black suranal dot.

Stage 6.—Head whitish, with a brown shade over the vertex, or pale brown, immaculate or with the three black patches ; eye black ; a groove at the vertex of each lobe ; width 1.3 to 1.5 mm. Thorax enlarged, mostly dorsally, the lateral outline regular ; segments neatly 6-annulate, with minute blunt white points on the second and fourth annulets. Whitish, not shining, a faint green tint dorsally. Thorax dark green from the large crop full of food ; posterior portion of alimentary canal nearly empty ; dorsal vessel greenish. No marks or a lateral smoky black band of segmentary dusky patches and traces of a geminal dusky dorsal shade. A small quadrate black suranal patch. Thoracic feet colourless, with brown tips ; tracheæ not very evident. Sits with the body outstretched or curled.

Stage 7 (ultimate stage*).—Head sordid whitish, vinous tinted or pale greenish, immaculate or with the spots represented by leaden or tar-brown shades ; width as before. Body the same colour, more or less shaded with tarry-brown in the folds and in an indistinct subdorsal shade.

Caliroa obsoleta, Nort. (CAN. ENT., XXVII., 338, 3S.)

Head very pale testaceous, eye black ; width .7 mm. Body colourless or very faintly greenish, food showing distinctly. Skin shining and sticky ; feet on joints 6 to 12, all colourless, including the thoracic feet. Thorax enlarged, the feet truncate.

Ultimate stage.—Not shining, rather opaque pale whitish ochreous ; segments obscurely annulate, with transverse dorsal shining areas.

Feeds on wild cherry (*Prunus serotina* and *P. pennsylvanica*). Rests on the under side of the leaves, never on the upper ; solitary. The larva is smaller than *Eriocampa cerasi*, without any trace of the blackish colour.

The variation in the number of submarginal cells and in the colour of the head in the larva of *Harpiphorus maculatus* recalls the case of *Monostegia quercus-alba*. If we disregard the colour of the head here also, there are still three well-marked types of larvæ as follows :—

1. On white oak, rarely on black oak ; sides of the thorax concolorous with the body ; head colourless, pale brown or black. Imago, 16 speci-

* I propose this term for that final larval stage of certain sawflies in which they do not feed, but only seek for a place for pupation ; the colour is usually markedly different from the preceding stage, but the head has the same width.

mens: four with two middle cells in hind wings, five with one middle cell, and seven with no middle cells (five of the latter are males; all the rest females). Larva with the pale head described in Trans. Amer. Ent. Soc., 1867, and CAN. ENT., XXVII., 195, as *M. q. alba*; with black head, described, CAN. ENT., XXVI., 43, and XXVII., 195 (the last time as *Caliroa obsoleta*).

2. On black oak, rarely on white oak and yellow birch; sides of thorax orange tinted; head whitish or black. Imago, nine specimens: seven with two middle cells in hind wings, at least on one side; two with one middle cell on both sides. Larva with pale head described, CAN. ENT., XXVI., 42, as *M. q. coccineæ*; with the black head, CAN. ENT., XXVII., 193, as *Eriocampa fasciata*.

3. On wild cherry, entirely pale, and never gregarious, as the two preceding generally are. Imago, four specimens with no middle cells in the hind wings. Larva described as *Caliroa obsoleta*.

Pristiphora grossulariæ, Walsh.

Larvæ common on gooseberry at Jefferson, N. H. The four last stages were observed with widths of head .4, .6, .8, 1.2 mm. The segments are obscurely 6-annulate, with minute dark setæ on the second and fourth annulets, and on the subventral region; no anal prongs. Walsh's description is sufficient.

Pristiphora tibialis, Norton.

I have already described this larva on birch and willow. The occurrence on the latter food plant would seem to confirm Norton's original suggestion that the species is the same as *P. sycophanta*, Walsh, since the larvæ might have entered a deserted gall on their food plant when preparing to spin and thus be classed by Walsh as "inquiline." More recently I have bred *P. tibialis* on high bush huckleberry (*Vaccinium*) from near New York City. The following is a description of the single larva found on this plant: Abdominal feet on joints 6 to 11. Head pale testaceous greenish, a brown shade from the eye to the vertex and a darker one on the median suture, spreading out on the clypeus; width 1.3 mm. Body clear green, rather dark; dorsal vessel a distinct black band edged with a broad green stripe of fat-granules which fade away to near the lateral area, blending into the ground colour. On joint 13 a dorsal and subdorsal mass of fat, the end of the joint solidly filled in with the green fat. Segments rather distinctly 6-annulate; subventral

folds black dotted. Thoracic feet faintly brownish. The larva rests on the edge of the leaf, curling its body more or less downward.

Nematus dorsivittatus, Cresson.

Larvæ on poplar at Jefferson Highlands, N. H. Identical with *Nematus mendicus*, except in size; width of head 1.7 mm. The dark spottings on the head fail to separate these species, for in these most recent specimens of *N. dorsivittatus* they are about as distinct as in *N. mendicus*. The anal prongs pointed, black tipped. Larva described, Trans. Am. Ent. Soc., XXII., 303.

Cladius pectinicornis, Fourc. (= *isomera*, Harris.)

Larvæ on wild rose in VanCortlandt Park, N. Y. Five stages observed with width of head .3, .5, .7, 1.0, 1.4 mm. No ultimate stage. The larvæ are already adequately described.

AGRONOMA AGAIN.

BY JOHN B. SMITH, SC. D.

In 1895, according to Mr. A. R. Grote, "the European type of *Agronoma* seems certainly to be *vestigialis*." This species was declared to be congeneric with the American species classed by me as *Feltia*, and the latter genus was dropped in favor of *Agronoma*, and Mr. Slingerland was scolded because he had adopted the generic name used by me. In the January (1896) number of the CAN. ENT. I pointed out for Mr. Grote's benefit, and also for the information of American students, that there existed certain points of structural difference which had escaped Mr. Grote's examination, which made the declared type of *Agronoma* a member of the genus *Agrotis* as restricted by me, the latter genus being based upon the very species which Mr. Grote said was its type. As the result of this paper, it has become much less "certain" to Mr. Grote's mind that *vestigialis* is, after all, the type of *Agronoma*, and on reconsidering the matter, it seems to him that *crassa* had better be considered the type. Mr. Grote states, in the June number of the journal of the New York Entomological Society: "I have examined here, in the Rœmer Museum, specimens of *crassa*. The fore tibiæ are heavily armed; the front is roughened or tuberculate; the male antennæ are pectinate. It is therefore a *Feltia* "..... "It follows that the type of *Agronoma* must be changed, and *crassa*, the first species cited, is then the type." It is to be noted that Mr. Grote refers to the front as being "roughened or

tuberculate," and this at once made it more than reasonably doubtful whether his conclusion, "It is therefore a *Feltia*," was justified; because in *Feltia* the front is not tuberculate; it is roughened and protuberant only. A tuberculate front is the chief characteristic of Mr. Grote's genus *Carneades* and of my genus *Porosagrotis*. It became necessary, therefore, for me to examine specimens of *crassa*, and this again presented evidence of Mr. Grote's failure to make strictly accurate, scientific statements. The structure of *crassa*, with the exception of the pectinated antenna, is exactly the same as that of his genus *Carneades*, and it adds force to what I previously said, that Mr. Grote did not recognize the extent of his own genus when he described it. The pectinations of the antennæ in this group are not of generic value. *Feltia* contains some species that have antennæ pectinated, and some that have them serrated. Both *Porosagrotis* and *Carneades* contain species ranging in the same way, with either pectinated or serrated antennæ; but the essential point, the tuberculate clypeus or front is characteristic of Mr. Grote's genus *Carneades*, and this is exactly what he failed to recognize in the European species *crassa*. My genus *Porosagrotis* is the only one ever described by me which is based on genitalic characters. In *Carneades* the clasper is forked, or consists of two prongs. In *Porosagrotis* the clasper is single. Now, in *crassa* we have exactly the same structure that we find in *Porosagrotis*, and the species is rather closely allied in general appearance to what I have described as *dadalus*, and also to Mr. Grote's species, *texana*. If *crassa* is the type of *Agronoma*, *Agronoma* must replace *Porosagrotis*. If *Porosagrotis* is not a good genus, because based on genitalic characters, Mr. Grote's *Carneades* must sink in favour of Hübner's *Agronoma*. It does not make very much difference to me which conclusion is adopted. Mr. Grote expresses himself as much obliged to me for showing the necessity of changing the type of Hübner's genus. I am equally obliged to him for giving me another opportunity to show how little his statements as to structural characters can be trusted.

There is another point that may be mentioned here. Mr. Grote has several times referred to *Mamestra comis*, and has questioned the correctness of my reference of this form to *olivacea*. Most recently he questions the correctness of my identification of the type, and from descriptions refers *circumcincta* as the same as *comis*. I called attention, in speaking of *comis*, to the fact that the insect was peculiarly set and that it was a remarkably pretty specimen, and I may add that the

description is a very good one of the type seen by me. The peculiarity about the specimen is that it was very fresh when caught, and the wings, apparently, had not become entirely hardened. When placed upon the spreading-board they broke near the base and formed a little shoulder, such as almost every one who has ever spread insects has found himself compelled to deal with. The insect was well spread in other respects, and the little break of the wings was almost concealed by the heavy vestiture of the thorax. With its bright colours and the comparatively broad, short wings, produced by the imperfection just mentioned, the specimen has quite a distinctive appearance, and it was in seeking to locate just exactly what this distinction consisted of, that I might place the species into its proper place in a synoptic table, that I found that it did not differ in any respect from *olivacea*. I have in my collection at the present time a specimen which agrees in brightness of colour and general appearance with *comis*, but being fully matured and with the wings at full length, shows its relation to *olivacea* at a glance. I would again call attention to the extreme desirability of verifying Mr. Grote's statements before accepting them when they involve a change in nomenclature or in the synonymy.

ADDITIONS AND CORRECTIONS TO MY 1894 LIST OF
WINNIPEG BUTTERFLIES, WITH NOTES FOR
SEASON OF 1895.

A. W. HANHAM.

Argynnis cipris, Edw.—One specimen taken August 4th. Kindly identified by Mr. James Fletcher.

Phyciodes carlota, Reak.—One specimen. June, 1894.

Phyciodes, sp.—Five specimens taken June 17th to 24th, 1894, and recorded as *Nycteis* in error in my 1894 list.

Phyciodes nycteis, Db.—Hew.—June 30th to July 10th. Common in a new locality visited this year. Not taken in 1894.

Colias eurytheme, Bdv.

var. *eriphyle*, Edw.—August 4th, etc.

var. *keewaydin*, Edw.—August 4th, etc.

Colias philodice, Gdt.—This species may not occur here; *C. eriphyle*, Edw., being mistaken, most likely, for it.

Pamphila ottoe, Edw.—June 30th (a ♀), July 1st (a ♀ and a ♂). The male was lying with its wings expanded (as if at rest) on a flower head in a clearing; it was dead, however, but a fair specimen. Kindly identified by Dr. Hy. Skinner.

Amblyscirtes vialis, Edw.—One. June 30th.

Owing to a visit to England in the spring, I did no collecting here until nearly the end of June, consequently many of the early-occurring species were missed. On the 23rd June very few species were flying. "Blues" were plentiful; *Scopoliolus* especially so, mostly ♀. Other species were: *Melissa* (only males), *Afra* (1), *Lucia* (1). "Skippers," only a *Cernes* and a worn *Pylades*. *Danaus archippus* and *Cænonympha inornata* complete the list.

From that date until the end of the season many visits were paid to the different favourite localities around the city, but "things," almost without exception, were scarce, and many of the species taken in 1894 were not met with. Not a single *Thecla* or *Papilio* was seen on the wing.

Phyciodes tharos, Dru.—Pupæ of this species were found on July 4th and 14th, attached to the palings of my back yard.

Pyrameis cardui, Linn., was very noticeable on the wing, in and around the city, at the end of June and early in July, and later the webs of its larvæ were thick among the thistle heads everywhere. Very few of these, I think, reached the "imago" state.

Cænonympha inornata, Edw.—Specimens of this butterfly taken June 23rd were mostly worn, but the species was met with as late as July 10th.

Lycæna melissa, Edw.—Captured or seen June 23rd, July 23rd, August 24th and 25th, and September 2nd. On August 25th I took my first and only ♀.

Thymelicus garita, Reak.—This species occurred in some abundance locally from June 30th to July 13th, but most of the specimens netted were poor.

Pamphila manitoba, Scud.—According to Dr. Skinner, my Winnipeg specimens are the var. *Assiniboia*, Lyman. I captured one this season (August 4th), and have yet to take my first ♀ here.

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No. 10.

SOME NOTES ON INSECT ENEMIES OF TREES.

BY A. D. HOPKINS, WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION.

The study of forest and shade tree insects is a line of entomological work demanding especial attention in the State of West Virginia. During the past two years I have carried out quite an elaborate line of investigations and experiments on this subject. The *first* object was to conduct investigations with reference to the forest conditions, the distribution of forest trees, and the relation of certain kinds of forest growth to the occurrence and range of the several life zones, and minor divisions of the same in the State. *Second*, to ascertain as far as possible the principal insect enemies of forest growth and their habits, as well as to study the climatic and other conditions that might be favourable or unfavourable for their multiplication; or the extension of their depredations. *Third*, to determine by experiments and otherwise some improved and practical method of preventing the losses that are occasioned by the more destructive kinds, especially those caused by bark and wood infesting insects.

Sufficient evidence has been obtained in the first object to enable me to prepare a preliminary map of the forest divisions of the State and the probable range of the life zones. Considerable information has also been added with reference to the habits of some of the more destructive insects, and some results have been obtained towards successful methods of preventing serious losses from their attacks on felled timber.

The studies with reference to preventives and remedies include a line of experiments which has already given good results and promises better ones in the future. The experiments include the cutting of different kinds of trees twice a month, year after year, until sufficient evidence is obtained to enable me to arrive at some definite conclusions with reference to the proper times to cut timber to secure the least possible damage from insect attack.

This line of experiments has been carried on regularly in different sections of the State since April, 1895. Observations are made from

time to time during the year, and the condition of the wood and bark is noted, together with the kinds of insects occurring in the same, the character of injury, etc.

It was found necessary to have some convenient method of ascertaining what insects bred in the wood and bark of trees cut in each month. Therefore an insectary was planned and built with this end in view. At present it consists of a room 12 feet long by 9 feet wide and 9 feet high. It is divided into four compartments or rooms, each 3 feet wide and 9 feet long, with 12 breeding cages or boxes, 18 x 12 x 18 inches, in one end. A door opens into each room, and a window 12 x 12 inches above the suite of breeding boxes, near the ceiling, gives the necessary light. The breeding boxes are arranged like drawers, in a case with doors in each opening into the room, and with a 2-inch round window in the back, opposite to a correspondingly small window in the wall. The object of the small windows in the boxes and in the ends of the rooms is to attract the insects to the light when they emerge so that they can be easily collected. Each room is devoted to one kind of wood,—as pine, oak, and hickory. Pieces of the trunk and branches of an infested tree are placed on shelves on one side of the room, and as the insects emerge they fly to the window, where they are collected in a cyanide bottle provided for each room. A shelf is attached just beneath each window and is covered with white paper, so that if any of the smaller insects die, they fall on it and are easily found.

The twelve boxes in the end of each room are used to breed insects from the wood and bark of trees cut in each month of the year. This arrangement of rooms and boxes is proving quite successful. Hundreds of specimens have been obtained, representing many species which would have been difficult to obtain in any other way, and in addition, many important facts have been learned with reference to the food habits of certain species.

One of the most interesting results that has been obtained is from hickory and oak, cut in the winter and summer of 1894. That cut in the winter months is being converted into a powder by *Lyctus striatus*, while that cut during the summer months is but slightly damaged.

I have also found from the cuttings in the forest that the wood of certain species of trees felled during the winter months, as well as of those felled in the late fall and early spring, are seriously damaged by wood-boring insects, while those cut in July and August are either entirely exempt, or but slightly damaged.

FIRE WOUNDS THE PRIME CAUSE OF SERIOUS LOSS OF TIMBER.

In studying the forest conditions and the influences that contribute to the destruction of timber, I have found that a slight injury to the base of a tree by fire offers favourable conditions for the attack of insects, which result in the final destruction of the valuable wood of the tree. The fire burns and kills the bark at one side of the base of the tree, which in itself might not be a serious matter, since subsequent growth would heal it over, but it was found that these slight wounds are subsequently infested by Ptinid, Scolytid and Calandrid beetles and their larvæ; also by Cerambycid, Buprestid and Lepidopterous larvæ, which by their boring either convert the inner dead wood into a dry powder, or their mines give entrance to a "dry rot" fungus*, so that another forest fire finds in these extended wounds the conditions most favourable for a still further extension of the injury. Thus, frequent fires in the same forest may, by this process, burn entirely through the trunk of a large tree.

It was also found that these fire wounds are almost invariably followed by a decayed condition of the heartwood, which results finally in a hollow trunk. Previous observations led me to believe that insects were largely to blame for the destruction of the heartwood of living trees injured by fire and other causes. I therefore had a number of wounded trees felled on November 9th, 1895, and the trunks split open so that I could examine the causes and effects.

I found in nearly every tree thus examined that the rapid extension of the decay was due largely to Cerambycid, *Lymexylon* and *Brenthid* larvæ which had entered from eggs deposited in the edges of the fire wounds, and that brood after brood of these larvæ, aided by wood-infesting ants, had completely honeycombed the heartwood for a great distance above the wound. Thus the valuable heartwood was completely destroyed or rendered worthless. By persistent search I was fortunate enough to find in the heart of a chestnut tree the imago of one of the Cerambycid borers, where it had recently transformed within its pupa case. It was located near the heart of the tree, and about four feet and a half above the upper edge of the wound, and three feet above any decayed wood. This beetle was identified for me through the kindness of Mr. Howard, of the Division of Entomology, as *Centrodera bicolor*.

On May 19th, 1896, I cut another example of this species from a tulip log, at Pickens, W. Va., where I had previously discovered (June

* *Merulius lacrimans*.

20th, 1894) a Cerambycid larva, that was found to be exceedingly destructive to the heartwood of large tulip trees, as mentioned in a former paper (Insect Life, Vol. VII., p. 150). Subsequent observations lead me to conclude that this is one of the most destructive wood-boring insects that infests the wood of living trees, and that the destruction of valuable timber by it results largely from primary injuries by fire.

The cocoons of a parasite (*Gymnosetis americanus*, C.) were found in larval mines, evidently of this species, in the same tulip log previously mentioned, which may be of some service in keeping this pest in check. It evidently attacks the larvæ at the time they are forming the exit gallery for the adult, since at other times the larvæ are so deep in the heartwood of the tree that they could not be reached by the ovipositor of the parasite.

On July 7th of the present year (1896), I found a female example of the large and beautiful *Leptura emarginata* ovipositing in the dead wood of a wound in a living beech tree, and numerous large holes were observed in the same wood, from which the beetles had evidently emerged, thus indicating that this species may also be classed among the destructive heartwood borers.

There are probably several other Cerambycid and Buprestid species that contribute to this class of injury to living trees, and, since the results of their work are practically the same, they may be designated as *Destructive Heartwood Borers*.

DESTRUCTIVE BARK BORERS.

With the exception of certain Scolytidæ, notably *Dendroctonus frontalis*, the most destructive and dangerous class of insects that attack living trees belongs to the genus *Agrilus*, since their habit of ovipositing in the bark of healthy trees in which it is possible for the larvæ to develop makes it possible for them to effect a terrible destruction of timber should they ever occur in sufficient numbers to take the character of an invasion.

Agrilus bilineatus is already to blame, either directly or indirectly, for the death of a great quantity of oak and chestnut timber, not alone in West Virginia, but in different sections of the country between here and the Mississippi River. Until last fall the dying of trees with which this insect was intimately associated was decidedly on the increase.

The beech, the dogwood (*Cornus florida*), the hickories, the horn-beam, willows and poplars are suffering more or less from the attacks of this class of bark-borers. These insects are, however, attacked by Braconid and other enemies that may tend to keep them in check; yet, notwithstanding this fact, they must be considered as among the most dangerous enemies of trees.

Sassafras and Sumac Twig Girdlers.—The injury to twigs and branches of sassafras and sumac by Cerambycid twig-girdlers has been on the increase for some years in our State, as is a similar trouble affecting the dogwood. I was fortunate enough to find the beetle that is to blame for the interesting double girdles so common on sassafras, which proved to be *Oberia ruficollis*.

Brenthid Injuries to Rock-Oak Logs.—An interesting observation was made with reference to injuries by *Eupsalis minuta* to rock-oak (*Quercus prinus*) logs from which the bark had been removed for tanbark. It was found that the logs bearing the mark of the axe, where they were girdled in the process of removing the bark, were infested with this destructive pin-hole borer, the eggs having been deposited in the axe wounds. Logs that were not injured by the axe were not infested. Since the peeled logs are often left in the forest for a year or more before they are converted into lumber, it is quite important that the sapwood should be injured as little as possible during the process of removing the bark. If the logs are not thus injured they may remain sound and make good lumber for several years after the tree is felled, but if injured as mentioned, the wood may be literally ruined by the Brenthid within one or two years after the bark is removed.

A Brenthid larva that appears to be quite different from that of *E. minuta* was recently found boring in the heartwood of a hickory tree, and the characteristic mines of Brenthid larvæ have also been observed in the heartwood of wild cherry (*Prunus serotina*) and other trees.

Hickory Nut Phylloxera.—On December 15th, 1895, I found a large hickory tree which presented quite a striking appearance. The nuts, of which it was very full, had not fallen, and upon closer examination it was noticed that they had assumed a curious abnormal growth, which was found to be the work of a Phylloxera. This is probably the work of *Phylloxera caryocaulis* or a nearly allied species (mentioned in Illinois Agr. Report, 1878, page 160).

A Maple Twig Borer (———) was one of the commonest shade tree pests in West Virginia during the past spring. It attracted general attention in all parts of the State, and was the cause of extensive correspondence in answer to inquiries. It is the larva of a moth that bores in the tips of the young, growing twigs of all species of *Acer*. So common was the injury by it that large trees presented the appearance, in June, of having suffered from a severe frost. It occurred in all the life zones of the State, from the Upper Austral to the Canadian. It makes its appearance soon after the leaves appear in the spring, and continues operations until about the middle of May, the moth emerging in June.

Oyster-Shell Bark-Louse on Pennsylvania Maple.—In May, 1896, I observed, while in the Canadian Zone of the State, that some of the small trees, and twigs on other trees of this maple, were out in leaf far in advance of other examples of the same species, the former being in fruit, while the latter had just commenced to flower. This was found to be due to the influence of the Oyster-Shell Bark-Louse, which occurred on all of the early fruiting twigs in great numbers.

The Locust Leaf Beetle (Odontota dorsalis).—This beetle is again common and destructive to the yellow or black locust leaves over the greater part of the State, it being destructive this year in localities which heretofore have been exempt. This beetle has been observed by me feeding on the leaves of white oak, beech, birch, hawthorn, and apple, thus indicating the possibility of its changing its normal habits and becoming destructive to the foliage of other trees, including the more valuable fruit trees.

A Remarkable Injury to the Leaves of Forest Trees by an Unknown Insect.—Last fall, while collecting in and near the western border of the Transition Life Zone, or what is known as Laurel Hill and Cheat Mountain, I observed that the leaves of all kinds of forest trees were literally riddled with holes of various sizes, as if they had been caused by hail when the leaves were young. This condition extended for a distance of four or five miles along the summit of the mountain and down the western slope to what appears to be the line separating the Upper Austral and Transition Life Zones. No trace or evidence could be found at the time to indicate what insect was to blame for this remarkable condition. The region has been frequently visited this spring and summer, and while the

same condition occurs this year as was noted last, and a large number of insects of various kinds have been observed feeding on the leaves, none of those I found were common enough, at any one time, to indicate that they were to blame for the trouble.

I am inclined to think now that it is the work of some nocturnal insect, possibly a Scarabæid.

Xyleborus celsus in Hickory.—On Dec. 1st, 1895, I discovered a number of colonies of a Scolytid in a hickory stump, which revealed numerous males of the species, as well as some good examples of the galleries. The interesting features of the discovery were presented to the W. Va. Academy of Science in a paper read at a meeting held on Dec. 3rd. Attention was called to the rarity of the male, and that this was probably the first time it had been found in company with the female. But one male was found in each colony of 40 to 50 females, and it was usually located at the farther end of one of the galleries, where it was imprisoned by the females, which were closely crowded in the galleries in Indian file, with their heads towards the inner end. One female guarded the single entrance to the suite of galleries from all intruding enemies by stationing herself just within the entrance and presenting her armoured elytral declivity as an impenetrable barrier to the would-be intruders. This habit and method of guarding the entrance to the brood-galleries is common with most Scolytidæ, and possibly serves in part to explain the object of the peculiar form of the elytral declivity in *Platypus*, *Xyleborus*, *Tomicus*, *Scolytus*, and other genera.

Some of the females of the bark-infesting species, after they have fulfilled their mission of forming the egg-galleries and depositing eggs, station themselves at the entrance, where they die at their maternal post of duty, their dead bodies forming as effectual a barrier against the entrance of certain enemies as if living.

The male *Xyleborus celsus* is evidently identical with Leconte's *X. biographus*, as was thought probable by Eichoff.

The Willow Leaf Beetle, *Lina lapponica*, was exceedingly common during the early part of the season, completely defoliating all kinds of willows in some sections of the State, and often doing serious damage to the foliage of certain cultivated poplars. Spraying with Paris green was recommended for the protection of cultivated willows and poplars.

Pines Exempt from the Attack of D. frontalis.—I have not, as yet, been able to find a single living example of *Dendroctonus frontalis* in the State since the fall of 1892. Thus, no opportunity has been offered to continue the experiment with the imported *Clerus formicarius* as an enemy of this species, as was intended. The sudden and apparently utter disappearance of *D. frontalis* over an area of some ten to fifteen thousand square miles, where it had occurred in such enormous and destructive numbers, is yet somewhat of a puzzle to me. What little evidence I have been able to obtain, however, points to a contagious disease, producing a widespread epidemic, as the only logical explanation of the phenomenon.

Last spring I received some pine bark from North Carolina, which had been taken from one of many pine trees that had recently died. This bark bore the unmistakable evidence of the work of *D. frontalis*, and an example of the species was found in the bark. The fact that the species is living in that section of the great pine belt would indicate that it is only a matter of time when another invasion may be expected.

Diseases of Forest Tree Insects.—On Dec. 25th, 1895, while cutting in a decaying beech log in search of the larva and imago of a large Buprestid, *Chalcophora campestris* (?), I found that large numbers of the larvæ and pupæ had been attacked and were completely enveloped by a white, fluffy fungous growth, resembling closely the description of Prof. Luger's *Isaria tomicii*. It was also found that this fungus had attacked and killed other insects that infested the log, including larvæ, pupæ and adults of the common Tenebrionid, *Nyctobates pennsylvanica*, and imagoes of the Scolytid, *Platypus compositus*. Apparently the same fungus was also found in the entrance to the brood-galleries of *Xyleborus celsus*, in hickory, which were filled with a brood of living beetles. The fungus had apparently crowded back the guarding female into the secondary galleries, where it, with other examples of the brood, appeared to be hopelessly imprisoned, since they did not appear to be able to emerge through the leather-like substance of the fungus.

PTEROPHORIDÆ.—Prof. C. H. Fernald, of the Agricultural College, Amherst, Mass., who recently published a valuable monograph upon the Crambidæ of North America, is now engaged upon a similar work on the Pterophoridæ, and would like to obtain materials from all quarters. He prefers that specimens should be sent to him pinned and spread, not in papers.

SOME NEW NEMATIDS.

BY C. L. MARLATT, U. S. DEPT. AGRIC., WASHINGTON, D. C.

The following descriptions of sawflies belonging to the subfamily Nematinae include, with one exception, a number of species which have been reared from the larvæ by Mr. H. G. Dyar. Mr. Dyar is anxious to publish the descriptions of the larvæ, and the technical descriptions of the species presented herewith are made to enable him to assign his larvæ to described species and avoid the difficulties which would arise from the description of larvæ before the adult insects have been characterized. The very valuable work which Mr. Dyar is doing in rearing larvæ is resulting in the clearing up of some puzzles in the classification of insects, and has no more interesting outcome than the fact that many of his rearings, at least in the line of sawflies, prove to be of species hitherto undescribed, showing how little we really know of the insects of this group in this country. The adults of most sawflies rarely leave their food-plants, and live but a few days, and hence it is not at all to be wondered at that so many species occurring on common plants have not been taken by collectors. The collected species, in fact, are usually only those which happen to frequent flowers and those taken by random beating, which, with insects of quick flight, like many sawflies, is not a very successful method of collecting. A vast deal of work will have to be done on the lines followed by Mr. Dyar before anything like an adequate knowledge of our insects in this family will have been gained. These species are additions to the recent revision of the Nematinae, published by the Department of Agriculture, as Technical Bulletin No. 3 of the Division of Entomology, and are described in conjunction with the tables and descriptions therein contained, so that the affinities of these additional species may be easily recognized.

Camponiscus americanus, n. sp.

Female.—Length, 6 mm.; a short, robust species; head broad, as wide or wider than thorax; clypeus deeply circularly emarginate; lobes broad, rounded; walls about ocellar basin sharply defined; frontal ridge strong, bulbous, unbroken; fovea broad, deep; antennæ short, tapering, smooth; joints three and four subequal, or three slightly longer than four; venation normal for genus; third cubital cell of left wing divided by a cross vein; claws bifid; teeth not very long, stout; sheath obliquely tapering on lower margin, fringed with short hairs; cerci long, strongly tapering. Colour reddish-yellow; antennæ dark brown above,

except at tip; small spot, including ocelli, tip of scutellum, meso-post-scutellum, and central area of metathorax, hind coxæ and base of abdomen beneath, dark brown; more or less of meso-epimera, femora, especially hind pairs, and tips of hind tibiæ and hind tarsi, brownish or infuscated; veins light brown, with yellowish hyaline portions, especially towards base of wings; stigma very broad, yellowish hyaline.

Male.—Length, 5 mm.; much more slender than female; antennæ more robust, compressed, not relatively much longer than antennæ of female; third cubital cell of anterior wings subject to much variation, bordering cross lines sometimes almost touching each other. Colour reddish-yellow and black; upper edge of antennæ, including all of two basal joints, large spot surrounding ocelli, lateral lobes of mesonotum, scutellum, metathorax, and abdomen, for the most part dorsally, together with spot on pectus and base of abdomen ventrally, with bases of posterior coxæ, brownish-black; legs uniformly reddish-yellow; hind tarsi slightly infuscated; veins little darker than in female; stigma yellow hyaline or very slightly infuscated about margin.

Described from two specimens, male and female, reared by H. G. Dyar, from larvæ on poplar, taken at Jefferson, N. H. This species is the first representative of the genus *Camponiscus* found in America. It seems to be distinct from any European species, and is a very interesting addition to our insect fauna.

A female of this species was also received for identification from Mr. Alex. McGillivray, collected at Franconia, N. Y. This specimen measures 8 mm., and presents a rudiment of a marginal cross nerve. The metathorax and the venter of the abdomen basally, as also the hind tibiæ and tarsi, are unicolorous with the body.

Pteronus ostryæ, n. sp.

Female.—Length, 6 mm.; moderately robust; clypeus very broadly circularly emarginate, lobes small; pentagonal area with distinctly elevated limiting walls; crest unbroken; fovea deep, triangular; antennæ long, tapering, third and fourth joints subequal; sheath short, rather robust, regularly tapering; claws deeply and evenly cleft; venation about normal; upper discal cell of hind wings considerably exceeding lower; stigma broad, regularly rounded on lower margin. Colour for the most part light greenish-yellow; antennæ, compound eyes, large spot, including ocelli and extending back over occiput, lobes of mesonotum and metanotum and base of dorsal sclerites of abdomen centrally, apex of

sheath, apex of hind femora, distinctly defined apical two-thirds of hind tibiae, hind tarsi and large spot on upper angle of meso-epimera, black or dark brown; wings hyaline; veins, except costal, brown; stigma brown.

Described from a specimen reared by H. G. Dyar, from a green larva (edge eater?) supposed to have come from hornbeam (*Ostrya americana*) taken in New Jersey. This species is closely allied to *P. odoratus*, Dyar.

Pontania terminalis, n. sp.

Female.—Length, 4 mm.; not very robust; shining; clypeus very shallowly, broadly emarginate; vertex with scarcely distinguishable pentagonal area, smooth or with ridges rounded, subobsolete; fovea shallow; antennae with third joint slightly longer than fourth; venation about normal; outer veins of discal cells of hind wings interstitial; stigma not very broad, tapering regularly to tip; claws large, deeply cleft; sheath narrow, regularly tapering, or slightly emarginate on lower edge; cerci short. Colour black, shining; apex of clypeus, other mouth-parts, angles of pronotum, tegulae and legs, for the most part, light yellow; extreme bases of coxae and hind tibiae and tarsi brownish-black; wings hyaline or nearly so; veins, including all of stigma, strongly infuscated.

Male.—Length, 3.5 mm.; much more slender than female; structure as in female; antennae slightly more robust and with shorter joints; colour as in female, except venter, which is reddish-yellow, more or less infuscated, especially on the lateral area.

Described from three females and two males reared by H. G. Dyar, from imperfect galls in the partly-rolled terminals of willow leaves. Specimens collected near New York City. Types in Coll. U. S. Nat. Mus., and collection of H. G. Dyar.

This species is somewhat closely allied to *Pontania hyalina*, but differs in important characters and distinctly in the habit of the larva in partly rolling the leaf and formation of imperfect gall.

Pontania populi, n. sp.

Female.—Length, 5 mm.; robust; shining; clypeus deeply emarginate; lobes somewhat pointed; labrum with rather long yellowish hairs; ridges about ocellar basin sharply defined; frontal crest stout, unbroken; fovea oval; antennae short, moderately robust, third joint a little longer than fourth; venation normal, except that the second recurrent is very near the second transverse cubital, and the outer veins of the discal cells of hind wings are interstitial or nearly so; claws deeply and

evenly cleft; sheath elongate, narrow, regularly tapering; cerci very slender and elongate. Colour black, shining; apical half of clypeus and other mouth-parts, broad outer angles of pronotum, tegulæ, and legs, for the most-part, light yellow; posterior tarsi slightly infuscated; extreme base of coxæ, especially posterior pair, brownish-black; venter of abdomen yellowish, strongly infuscated; wings hyaline; veins, including all of stigma, dark brown.

Described from a single female, reared by H. G. Dyar, from larva collected in New York. This species is related to *Californica*.

The larva is practically the same in habit as *P. terminalis*, except that it is a different colour and lives on *Populus grandidentata*.

Amauronematus azaleæ, n. sp.

Female.—Length, 7 mm.; rather slender; clypeus very broadly and shallowly emarginate; frontal crest very strongly raised, bulbous, unbroken; walls about ocellar basin distinctly defined, not very prominent; fovea shallow, elongate, oval; antennæ short, tapering, fourth and fifth joints longer than third; claws deeply cleft, rays subequal; sheath pointed, with distinct scopa near tip; cerci long, slender, nearly filiform; venation normal; stigma narrow, strongly acuminate. Colour dull black and pallid white, the latter restricted to face below antennæ, orbits, pronotum, tegulæ, and entire venter except meso-epimera and sheath, more or less of the margins of some of the basal dorsal sclerites and lateral edge of all of dorsum of abdomen, including the sides of the large clasping terminal arc, also pallid; legs slightly infuscated on upper and lower edges of femora, tibiæ and tarsi; hind tarsi altogether infuscated; wings hyaline, veins dark brown, including all of stigma.

Male.—Length, 5.5 mm.; slender; structurally about as female. Colour the same, except that the abdomen is black above and the lateral area of the ventral sclerites is strongly infuscated; the pronotum is also more or less black near the anterior edge, and the extreme base of coxæ, especially the hind pair, is more noticeably infuscated.

Described from two specimens, male and female, reared by H. G. Dyar, from larvæ collected at Jefferson, N. H., on Azalea. The female of the species is very near *oregonensis* in colour, but differs in the darker stigma and wing veins, and in the infuscated terminal dorsal arc of the abdomen.

Amauronematus similis, n. sp.

Female.—Length, 9 mm.; rather slender, graceful; surface of head and thorax finely punctured, opaque; abdomen smooth, shining; insect clothed with very short fine whitish pubescence; clypeus narrowly, rather deeply, emarginate; lateral walls about ocellar basin rounded; frontal crest deeply broken by backward extension of deep elongate antennal fovea; antennae short, tapering, third joint shorter than fourth or fifth; claws evenly and deeply notched; sheath elongate, slightly tapering, rounded at tip; cerci filiform, nearly as long as metatarsal joint of hind foot. Colour black; triangle beneath antennae, clypeus, labrum, cheeks, base of mandibles and wide angles of pronotum, yellowish-white; labium and palpi greatly protruding, black; anterior faces of fore legs, from the middle of femora downwards, yellowish infuscated; venter of abdomen, except apex, yellowish, especially on lateral margin, with base of segments strongly infuscated and all very much obscured with brownish-black; wings hyaline or very slightly clouded near veins; veins and stigma black.

Described from a single female reared by H. G. Dyar, from larvæ on willow, collected at Jefferson, N. H.

This species is closely allied in general appearance to my *A. Comstocki* and *A. gracilis*, but differs in important colorational characters, and seems intermediate between the two. It may be that ultimate rearings will show that all three of these species, now apparently distinctly differentiated, are merely varieties or indicate wide seasonal or local variations.

Amauronematus Dyari, n. sp.

Female.—Length, 6 mm.; robust; head and thorax opaque; clypeus shallowly emarginate; walls of ocellar basin wide, rounded, frontal crest distinctly broken; antennal fovea circular, with branches extending over base of antennae; antennae short, moderately robust, joints not at all nodose at tips, 3-5 subequal; venation about normal; stigma rounded on lower margin, not tapering; sheath tapering, obtusely pointed, clothed with short and rather dense hairs; claws deeply and evenly cleft. Colour resinous-yellow, with the thorax and head reddish; antennae, narrow ring about each ocellus, meso-postscutellum, black; meso-scutum and more or less of centre of basal plates brownish; tips of posterior tibiae and their tarsi slightly infuscated; wings hyaline, veins light brown, stigma and costa yellowish hyaline.

Male.—Length, 5 mm.; not robust, approaching slender; clypeus much more distinctly emarginate than in female; character of vertex and antennæ about as in female; procidentia very short and broad, more than twice as wide as long; venation and claws as in female. Head, for most part, and thorax and abdomen above, black; face below antennæ white; most of pronotum, the tegulæ and the venter, with legs, resinous-yellow; pro-episterna, and base of meso-epimera, brown; abdomen slightly smoky beneath; posterior tibiæ and their tarsi slightly infuscated, legs hyaline, veins brown, stigma and costa hyaline, former darker basally.

Described from two bred females and two bred males in Coll. of H. G. Dyar. This species is closely allied to *brunneus*, and was briefly described by Mr. H. G. Dyar (including a careful description of the larvæ), from six males and four females under Norton's species, *Nematus monochroma*, from which, however, it is unquestionably distinct. The larvæ are gregarious edge-feeders on poplar, somewhat resembling the larvæ of the common willow sawfly (*Pteronus ventralis*) in appearance and habit [see CAN. ENT., XXVI., page 187, 1894].

Pachynematus gregarius, n. sp.

Female.—Length, 4.5 mm.; not robust, surface shining; head distinctly narrowing back of compound eyes; clypeus broadly and shallowly emarginate; pentagonal area depressed, limiting ridges low, rounded; frontal crest unbroken, not prominent; antennal fovea shallow; antennæ short, slender, scarcely tapering, third joint distinctly longer than fourth; sheath short, obliquely truncate, pointed at tip; first transverse cubital hyaline or subobsolete; upper middle cell of hind wings considerably exceeding lower; stigma broad, rounded on lower margin, not tapering; claws with inner tooth remote from apex. Colour brownish-black and resinous-yellow; antennæ, head and dorsum of thorax and abdomen for the most part, sheath and upper half of meso-epimera, dark brown; mouth-parts, tegulæ, outer one-half of pronotum, legs and venter, together with lateral margin of dorsum of abdomen and terminal dorsal sclerites, yellow; light area of epimera and pronotum slightly infuscated; wings hyaline, stigma and nervures light brown.

Male.—Length, 4 mm.; structurally as in female, except that the ridges about ocellar basin are more sharply defined; procidentia narrow, tapering, pointed at tip; antennæ, large spot on vertex about ocelli and extending over occiput, thorax above except pronotum and tegulæ, and central dorsal area of abdomen (paling towards tip), brownish-black;

balance of insect resinous-yellow, except slight dark spot beneath wings.

Described from one female and one male bred by Mr. H. G. Dyar, from larvæ taken on willow in New Hampshire and New Jersey. The larvæ are described as resting flatly on the surface of the leaves, which they skeletonize, and as being gregarious and, in appearance, shining like a slug.

Types in Coll. U. S. Nat. Mus.

Pachynematus pubescens, Marlatt.

Male.—Length, 8 mm.; elongate, slender; head and thorax densely clothed with long sordid yellowish hairs; clypeus shallowly emarginate, strongly transversely keeled; ridges about ocellar basin distinct, but slight; crest not prominent, unbroken; fovea oval; antennæ very long and slender, joints nodose at tips, fourth and fifth longer than third; third cubital and second recurrent, and outer veins of discal cell of hind wings interstitial; third cubital cell large, divaricating apically; stigma long, narrow, tapering; procidentia wide, tapering, truncate at tip; inner tooth of claw very minute. Colour black, shining, including all of head, with mouth-parts, pronotum and tegulæ; apical half of hypopygium, apices of femora, and the tibiæ and tarsi, reddish-yellow, infuscated; genitalia pallid; wings hyaline, veins brown, stigma yellowish, usually with a brownish tinge, much darker than stigma of *apicalis*.

Described from six specimens from Cornell University, collected on Mount Washington, at an elevation of 5,500–6,000 feet, July 9th, 1891. In structural and colorational characters the male of this species is very close to the male of *extensicornis*, but is readily distinguished by the remarkable hirsute clothing of the head and thorax.

The female of this species was described in my Revision of the Nematinae of North America. (Tech. Ser. No. 3, U. S. Dept. Agric., Div. Ento., 1896, p. 100.)

Hemichroa laricis, n. sp.

Female.—Length, 5.5 mm.; robust; shining; clypeus broadly, shallowly, emarginate, and with strong transverse ridge near base; pentagonal area distinctly defined; ridges somewhat rounded; fovea shallow, circular; antennæ very slender, filiform, fourth joint much longer than third; sheath short, rounded at tip; cerci short; claws simple, without inner tooth; venation normal. Colour black; mouth-parts scarcely paler than the general body colour, or very slightly reddish; tegulæ and legs

pallid, strongly infuscated; coxæ black; wings slightly infuscated; veins brown, stigma pale centrally.

Described from a single female reared by H. G. Dyar, from larva collected on larch.

Mr. Dyar states that this is identical with the larva referred to in the Fifth Report of the U. S. Entomological Commission, as No. 26 of larch insects, *Selandria* sp.?, page 901. Mr. Dyar's specimens were collected at Jefferson, N. H.

ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

EIGHTH ANNUAL MEETING, BUFFALO, N. Y., AUGUST 21-22, 1896.

The Association was convened in the Lecture Hall of the Library Building, Buffalo, N. Y., and its meetings were attended by some nineteen active members, including the following officers: President, C. H. Fernald; Vice-president, F. M. Webster; and Secretary, C. L. Marlatt. The Entomological Society of Ontario was represented by the Rev. C. J. S. Bethune and Dr. James Fletcher. A number of entomologists not members of the Association were also present, with other zoologists, the number of persons present at the meetings averaging about thirty.

The following new active members were elected:—

W. G. Johnson, College Station, Md.

E. E. Bogue, Stillwater, Okla. Ter.

James S. Hine, Wooster, Ohio.

C. W. Mally, Wooster, Ohio.

H. L. Frost, Boston, Mass.

M. F. Adams, Buffalo, N. Y.

Lewis Collins, Brooklyn, N. Y.

W. E. Rumsey, Morgantown, W. Va.

The following new foreign members were elected:—

Chas. P. Lounsbury, Department of Agriculture, Cape Town, Cape of Good Hope.

Fred. Enock, 21 Manor Gardens, Holloway, London, England.

Dr. Enzo Reuter, Fredriksgatan, 45 Helsingfors, Finland, Russia.

Frederick B. Theobald, Wyecourt, Kent County, England.

Dr. Antonio Berlese, R. Scuola Superiore de Agricoltura, Portici, Italy.

Dr. Paul Marchal, 16 Rue Claude Bernard, Paris, France.

W. C. Grasby, Parkside, Adelaide, South Australia.

The active membership of the Association now numbers eighty-six, and includes practically all the leading workers in economic entomology in the United States and Canada. The foreign membership numbers twenty-nine, and comprises the leading official economic entomologists of the world.

A number of resolutions were passed ; among others, the following : Resolutions (1) relating to the death of Dr. C. V. Riley, the originator and first president of the Association ; (2) urging the publication by the U.S. Department of Agriculture of a general index to the seven volumes of *Insect Life* ; and (3) recognizing the importance of the work being done by the State of Massachusetts in the control of the gypsy moth, urging the continuance by the State of work in this direction and expressing the greatest confidence in the officers now charged with it.

The annual address of the President, Mr. C. R. Fernald, Professor of Entomology, Massachusetts State Agricultural College, Amherst, Mass., was entitled "The Evolution of Economic Entomology," and was devoted to a historical resumé of the progress in the practical control of insects from the earliest times to the present. The following papers were read and discussed :—

"Some Temperature Effects on Household Insects."

"On the Futility of Trunk and Crown Washes for Elm Leaf Beetle."

"Remarks on Steam Spraying Machines."

By Dr. L. O. Howard, Chief of Division of Entomology, U.S. Department of Agriculture, Washington, D.C.

"Three Years' Study of an Outbreak of the Chinch Bug in Ohio."

"Insects of the Year in Ohio."

By Prof. F. M. Webster, Entomologist to the Ohio Agricultural Experiment Station, Wooster, Ohio.

"A New Insecticide."

By A. H. Kirkland, Assistant to the Gypsy Moth Committee, Malden, Mass.

"Comparative Tests with New and Old Arsenicals on Foliage and with Larvæ."

"Insecticide Soaps."

By C. L. Marlatt, First Assistant, Division of Entomology, U.S. Department of Agriculture, Washington, D.C.

"Enemies of the San José Scale in California."

By Dr. J. B. Smith, Entomologist to the New Jersey Agricultural Experiment Station, New Brunswick, N.J.

"Insect Enemies of Forest Trees."

"Notes on Some Observations in West Virginia."

By Prof. A. D. Hopkins, Entomologist to the West Virginia Agricultural Experiment Station, Morgantown, W. Va.

"Notes on Insect Attacks of the Year."

By Dr. J. A. Lintner, State Entomologist, Albany, N. Y.

"Entomological Notes from Maryland."

By W. G. Johnson, State Entomologist, College Station, Md.

The following papers, the authors of which were not present, were read by title, but, it is expected, will be included in the published proceedings of the Association:—

"The Grasshopper Disease in Colorado."

By C. P. Gillette, Professor of Zoology in the State Agricultural College, Fort Collins, Colo.

"The Development of the Mediterranean Flour Moth."

By F. H. Chittenden, Assistant in Division of Entomology, U. S. Department of Agriculture, Washington, D. C.

"Notes on the San José Scale."

By W. B. Alwood, Vice-director of the Virginia Agricultural Experiment Station, Blacksburg, Va.

"A New Garden Smynthurid."

By F. L. Harvey, Professor of Entomology in the Maine State College, Orono, Maine.

"A Simple Device for the Preparation of Oil Emulsions."

By H. A. Morgan, Professor of Entomology in the Louisiana State University, Baton Rouge, La.

The following officers were elected for the ensuing year: President, F. M. Webster; first Vice-president, Herbert Osborn; second Vice-president, Lawrence Bruner; Secretary, C. L. Marlatt.

In accordance with the established custom, the next session will be held on the two days preceding the general sessions of the American Association for the Advancement of Science, Detroit, Mich., August 6—7, 1897.

C. L. MARLATT,

Secretary.

NOTES ON COLEOPTERA—No. XII.

BY JOHN HAMILTON, M.D., ALLEGHENY, PA.

Liparocephalus cordicollis, Lec.—This species does not differ in any way from *L. brevipennis*, Mæk., except in its pale colour, and the two forms must be united, as intimated in a former paper (CAN. ENT., XXIV., 158). Since the publication of that paper more than thirty examples of *brevipennis* and several of *cordicollis* have been examined and compared. Apart from colour, not a single character of general applicability has been observed by which to separate them into species. The synoptic characters given by Capt. Casey (Ann. N. Y. Acad. Sci., VII., 354) are without value otherwise than as descriptions of those of some individuals. When a sufficient number of each form is present, all the elements, without exception, tabulated by him to differentiate *cordicollis* exist in examples of *brevipennis*, and the reverse.

L. brevipennis is very variable in most of its structural parts (length of antennæ, width of head, form of thorax, etc.), for which due allowance must be made, or about four species created.

It may be observed that Dr. Leconte described *cordicollis*. He had seen only one example from the sea coast of California, and one of *brevipennis* from Unalashka, both of which, from his remarks, were evidently extremes, such as now exist. The pale colour of *cordicollis* may be from immaturity, just as in other dark *Staphylinidæ*, or it may be permanent, as occurs in variations of *Cryptobium bicolor*, *Belonuchus formosus*, etc. Rev. J. H. Keene, Massett, Queen Charlotte Islands, to whom I am indebted for such ample material, writes that he takes both forms together on the beach under rubbish in early spring, while later the pale form is not so often seen.

Tachinus Schwartzi, Horn, is by no means a common insect, and is mentioned here to record its occurrence in the mountainous parts of Western Pennsylvania. I took several examples recently in Forest County, in the pine region, from a decaying boletus growing on a pine log. It may readily be known by its black colour, elytra longer than wide and with distinct traces of sulci; the last joint of the antennæ, the four basal, and the legs, rufous; the sixth ventral segment of the male is deeply and widely emarginate, and in front of the emargination concave to the base and finely punctate, but without granulations. It was described from examples taken near Detroit, Michigan, and is known from Canada.

Trogoderma tarsale, Mels.—The larva of this species is unfavourably known as an occasional museum pest, and is generally supposed to live solely on animal matter, which it undoubtedly prefers; but it can likewise live on vegetable food as well, as the following demonstrates: A few packed figs were placed in a paper sack and securely tied and placed in a trunk while in Florida, in May, which was not opened till May of the next year, when the figs were found infested by the larvæ and pupæ of this species, while over sixty recently disclosed beetles were taken from the sack. Possibly in this instance the parent beetle may have accidentally been inclosed with the figs, and may not have from choice selected them as suitable food for her offspring, but it is in demonstration that this species can propagate itself on either animal or vegetable products.

The larvæ are more readily distinguishable from those of *T. ornatum* than are the beetles themselves; those of the latter have the last three abdominal segments dark; in the former some have the last three dark, with a spot on each side of the preceding two; some with the last and a spot on each side of the preceding two, dark, while one is occasionally seen entirely pallid. Both species pupate within the larval skin wherever it may be convenient.

Corymbites elongaticollis, Ham.—I find that this species is placed in some collections as *caricinus*, Germ., to which it bears considerable resemblance. It has been, as yet, taken but rarely in Western Pennsylvania, but appears to be more common in Canada, where I have likewise taken it. I have not seen an example of the true *caricinus* from the region eastward from the Mississippi, and I strongly doubt its existence there. Any comparison between the two species must be made with *caricinus* from the Pacific Coast. Several obvious differences will be observed: in *caricinus* the front is prolonged and much depressed at middle like in *Asaphes*, the depressed portion being smooth and with a few coarse punctures; in *elongaticollis* the front is distinctly and uniformly elevated, more or less transversely concave and densely punctate; in the former the thorax is less depressed, uniformly rather densely and coarsely punctured, the punctuation of the latter being comparatively fine, sparse on the middle, denser on the sides; in *caricinus* the elytral intervals are less convex and therefore apparently wider. Many other differences exist—difficult to make plain in print to such as have not both forms, useless to such as have. No one having both would for a moment proclaim them the same species. Whoever united *umbricola*, Germ., with *caricinus*

could not have had good material of both forms before him or such a bad mistake would not have likely occurred. I have good material of the former from Vancouver and from Queen Charlotte Islands, and of the latter from Queen Charlotte Islands, and their union cannot be entertained when compared.

Agrilus macer, Lec., seems to be rare. It was described from Texas (Eagle Pass); one male occurred here five years ago, but it has not been taken since. If Dr. Horn's and Dr. Leconte's examples were ornamented with pubescence, it is not clearly set forth; in that taken here, on each side of the thorax above is a broad marginal band of white pubescence; the sternal side pieces, the vertical portion of the ventral segments, and a large spot on each side of each of the ventral segments, white, as in *difficilis*, from which it may at once be known by the furcate or emarginate projecting carina of the pygidium. In this sex the elytra are acute at tip as well as rounded and serrate, just as in *difficilis*. I have observed no other record of distribution than the above, but quite likely it is mixed in collections with *difficilis*.

Phyllodecta vitellina, Linn.—This species is recorded from Canada, Michigan and New Hampshire. No American examples have been seen, and there is strong presumptive evidence that *vulgatissima*, Linn., is the species so determined by Kirby; in his time, in Britain, the latter species was placed as a synonym of *vitellina*, and of course he would give the same name to the American examples. *Vulgatissima* is common in the regions mentioned, but no example of the other species is known. The two species are difficult to separate, even with the insects in hand, and it is more so to make an intelligible description of their differences. In both species the colour of the upper surface is equally variable—green, violet, purple or bronze; the surface of the thorax is a little uneven, sparsely irregularly finely punctured on the disc, more densely toward the sides; the elytra are serially punctured in undulating rows of fine, close-set punctures; these rows are usually much confused before the apex and at the sides; the intervals are usually impunctate. The differences at first sight are not very evident, the chief being the more elongated form of *vulgatissima* and the carination of the lateral elytral interval; *vulgatissima* is .19 inch. in length; *vitellina* .17 inch., with the width of the former and a little more convexity, which gives it a more robust appearance. The carination of the lateral elytral interval used by European authors to divide the genus into sections is not a very evident character;

by a careful examination may be seen a row of fine punctures next the margin, separated from the general surface of the elytron by a more or less sharp line, while in *vitellinae* this row of punctures is more or less obsolete and not sharply separated from the confused punctuation of the contiguous surface. A little faith is sometimes required to see these differences. It would be useless to enter into more minute details, as anyone who cannot identify his insects by those given would probably fail with both species in hand. If *vitellinae* occurs in North America, the above may be sufficient to cause its recognition.

P. interstitialis, Mann.—This species was described from the Yukon, from a single example, and is usually set down by American writers as a synonym of *vulgatissima*, the type being considered as perhaps deformed. The description seems, however, to forbid such an assignment, as, in addition to the usual stria arrangement, the whole of the elytral surface is represented as deeply and coarsely punctured. I have examined many specimens of the American and European *vulgatissima*, and likewise of the European *vitellinae* and *cavifrons*, in all of which the intervals are practically impunctate, and show no tendency to become punctured in any degree. *Interstitialis* by description is a valid species,

Amblyderus (Anthicus) pallens, Lec., was described from examples taken on the shores of Lake Superior; a form taken on the sea coast of New Jersey, and southward, by others as well as myself, seemed from description to be the same, but it is only recently that I have been able to be assured of their identity by direct comparison of specimens. Mr. Wickham has kindly sent four examples from the southern shore of Lake Superior, between which and those from the Atlantic Coast there are seemingly no differences except those of individuality. Of those sent by Mr. Wickham, one is entirely pallid throughout, one has the abdomen partly fuscous, another entirely so, and the fourth has in addition the elytra pale livid, indicating that there may be a melanotic form. Of six sea-shore forms, two are entirely pallid, the other four have the abdomen infuscate and one of them also the elytra slightly. Inasmuch as the original description is out of print, its reproduction may be useful on account of the redescription by Capt. Casey in his recent revision of the *Anthicidae* being so seriously defective as to be misleading, describing the entirely pale and exceptional form not mentioned by Dr. Leconte, but giving no hint of the common form with the fuscous abdomen—Leconte's species.

"Testaceous, convex, pubescence white, eyes black; head triangular, base emarginate with the angles acute, a smooth longitudinal line, moderately punctate; thorax not narrower than the head, shorter than wide, obovate, obsoletely canaliculate, rather densely punctate; elytra very finely punctate, apex subtruncate; abdomen dark fuscous (*nigro-fusco*). Length, .11 inch."—[TR.] Agassiz, Lake Superior, p. 231. Supplementary characters were added (Proc. Acad. Nat. Sci., Phil., 1852, p. 103): "Head sparingly granulato-punctate, thorax very strongly narrowed posteriorly; elytra convex, truncate at base; antennæ slender and long, terminal spurs of tibiæ very distinct, those of anterior tibiæ very unequal, the anterior tibiæ of the male slightly sinuate internally and the terminal spine more prominent." The elytra do not cover the abdomen. The pallid examples occur on the coast among the hills of white sand immediately fronting the ocean, and I took one on the beach of Anastasia Island, Florida; those with dark abdomens, a little further back at the base of those bordering on the salt meadows.

Under the name *A. arenarius*, Capt. Casey has described from a unique taken at Newport, Rhode Island, what seems to be the form of *pallens* with the fuscous abdomen, as described by Dr. Leconte.

MISCELLANEOUS NOTES.

Stagmomantis carolina, Linn.

In his index to the Mantidæ of North America (CAN. ENT., August, 1896, 211), Mr. Scudder gives the range of this species as "Florida to Arizona. . . . north to Maryland, Southern Illinois, Missouri, Kansas, and Utah."

He might also have included the southern half of Indiana, since it is common in the counties bordering on the Ohio River, and is occasionally taken as far north as the City of Indianapolis; specimens taken here (females, brown form) having been brought to me on Sept. 23rd and 26th, 1895, and Sept. 4th, 1896. I have also a green female from Mitchell, Lawrence Co. Mr. S. G. Evans, of Evansville, Ind., in a personal letter, says: "The Mantids are found here of all sizes and colours, the eggs and young being almost as common as mosquitoes. I have on several occasions placed male and female together in a glass jar, and the female always devoured the male, and generally while in the act of copulating, the bodies remaining together until the male was almost consumed."

Gonatista grisea, Fabr.

The specimen from Indiana mentioned by Mr. Scudder (*loc. cit.*)

was taken by Mr. Evans, at Evansville. As he thought it to be a short-bodied form of *S. carolina*, he has no recollection of the exact date or place in which it was found.

Acanthosoma cruciata, Say.

Mention of this handsome member of the family Pentatomidæ occurs in but few of the published lists of Heteroptera. This is probably not so much due to its scarcity as to an ignorance of its food-plant and habitat. In Indiana I have found it in abundance on several occasions, but always on the leaves and stems of Spikenard (*Aralia racemosa*, L.), growing on the sides of deep damp ravines. The mature insect may be taken during August and September.

Trichopepla semivittata, Say.

This is another uncommon Pentatomid, which appears to have a special food-plant. I have taken it but once, Sept. 9th, 1894, in Vigo Co., Ind., where I found it very common in all stages, on the heads, and in the angles of the leaves, of the plant known as Rattlesnake-Master, or Button Snake-root (*Eryngium yuccifolium*, Michx.). The insect will probably be found wherever this plant abounds.

Libythea Bachmani, Kirtland.

This little butterfly, so readily known by its long, beaklike palpi and angled fore wings, is usually of rare occurrence in Indiana. This season, however, it has been very common, and has been noted in a number of localities in the State. On June 14th, eighteen specimens were secured from the flowers of some basswood trees (*Tilia americana*, L.), which stand in front of my residence, in a thickly settled portion of the City of Indianapolis.

Papilio philenor, L.

This butterfly is very common in Indiana, and for a long time I was puzzled as to its food-plant, the ones commonly mentioned in the books, *Aristolochia serpentaria*, L., and *A. sipho*, L'Her, being in the State. The problem was solved one day, however, when I saw the larvæ of *philenor* feeding upon the leaves of the wild ginger (*Asa. Canadense*, L.), a common plant along the rich hillsides of Central and Southern Indiana, and one which belongs to the same family as the different species of *Aristolochia*.

Indianapolis, Ind.

W. S. BLATCHLEY.

BOOK NOTICES.

THE GYPSY MOTH.—A report of the work of destroying the insect in the Commonwealth of Massachusetts, together with an account of its history and habits both in Massachusetts and Europe. By E. H. Forbush and C. H. Fernald.

This report, a handsome volume of nearly 600 pages, well printed and most copiously illustrated with chromolithographs, photogravures, and wood cuts, gives a full account of the introduction of the now notorious "Gypsy moth" into America by Leopold Trouvelot in 1868 or 1869, traces its history, and records the efforts which have been made to exterminate it by the State of Massachusetts up to the end of 1895. The spread of this insect for the first ten years was remarkably slow, in the light of what we now know of its capabilities for harm. During that period it was not noticed by anyone but the introducer. The first extensive outbreak was in 1889, but for ten years before that it had given great annoyance to the people living in the part of the town of Medford where it was first introduced. It had also spread and had gained a foothold in thirty townships without attracting public attention. Since that time its history is well known. In 1890 the first Gypsy Moth Commission was appointed and the work of fighting the pest was inaugurated. In February of the next year this commission was removed and another one substituted. On 12th of March, Mr. E. H. Forbush, the present very efficient Director of Field Work, was appointed, and on 18th June Prof. C. H. Fernald began his labours as Entomological Advisor. Since that time the work has been pushed on with great energy, and the present valuable report is an outcome of the combined efforts of a practical, energetic manager and a careful scientific entomologist. The two parts of this report, prepared by the above-named officers, are quite distinct and form together a very complete treatise, not only upon the Gypsy moth, but upon the general principles which it is necessary to study when combatting any injurious insect. This carefully-prepared report, therefore, cannot but be for a long time an indispensable book of reference for economic ento-

There are in this volume many things which will attract the attention of entomologists. Indeed, it is so full and there are so many different subjects treated of, that even to give the titles would take more space than is at my disposal. The first thing which will be noticed is the adoption of the generic name *Porthetria*. Articles of particular note deal with

the studies made as to the methods of distribution of the Gypsy moth, and the measures practised for the destruction of the insect in its different stages; spraying apparatus; and particularly the care of spraying machinery; methods of pruning; and some charming observations upon insect-eating birds.

The scientific work contained in Professor Fernald's report is of great value and contains a record of most painstaking and patient work. Probably one of the most interesting sections is that which deals with Natural Enemies, in which most excellent work has been done. Prof. Fernald has been aided in this work by efficient assistants, and the whole information so gained has been pieced together by a master hand.

With regard to spraying, some surprising results have been obtained. In the first place, the caterpillar of the Gypsy moth seems to be little affected by applications of Paris green when applied of the strength ordinarily used for other mandibulate insects. Mr. Forbush says: "It became evident before the end of the season of 1891, that spraying, while reducing the numbers of the moth, could not be relied upon as a means of extermination, for many caterpillars survived its effects."

The following conclusion, on page 139, will show entomologists that the matter of controlling mandibulate insects, by means of active poisons, is still a fertile field for careful work, in which useful and laurel-bearing results are still to be reaped:—

"Every effort was made during the spraying season to determine why the results of spraying were not uniform and satisfactory. The feeding caterpillars were watched day and night by many observers. The spraying was most carefully superintended, and the conclusion finally arrived at was that, under ordinary conditions, spraying with Paris green for the Gypsy moth was ineffective and unsatisfactory."

Paris green was on the whole the most fatal insecticide, and when used in the proportion of one pound to 150 gallons of water, did not burn foliage; but with larger proportions, did considerable harm. The injury developed so rapidly that within a short time the leaves were all killed and the surviving larvæ had to go elsewhere to feed. "Therefore, a strong Paris green mixture had little better effect than a weak one. Lime was then used with the Paris green, with a view of neutralizing the burning; but considerable injury to the foliage still continued."

Probably one of the most remarkable facts discovered by the entomologists is related by Prof. Fernald, on page 476, where he says: "One

interesting result obtained from the analyses of the different stages of the Gypsy moth made in 1893 and 1894 is that pupæ and imagoes from caterpillars which have been reared on leaves sprayed with Paris green or arsenate of lead may contain arsenic in recognizable quantities. Several pupæ and a few female imagoes obtained under these conditions, when subjected to chemical analysis, gave ample evidence of the presence of arsenic in their bodies. This shows that the presence of arsenic in the pupa may not materially interfere with the processes involved in the development of the imago. Since, as has been repeatedly demonstrated, moths reared from poisoned larvæ are capable of reproduction, it is also evident that the arsenic contained in their bodies does not injure the reproductive function." With reference to the amount of arsenic which could be consumed by some of these caterpillars, and yet leave them "normally active and healthy," it was found that some of them had in their bodies, in proportion to their weight, an amount equivalent to $12\frac{1}{2}$ times the fatal dose for an adult human being, in proportion to the weight of the latter.

The work of the Gypsy Moth Committee has been criticised, examined and studied by practical men who were entomologists and others who were not. As far as I can learn, the general verdict is that excellent work, and, under the circumstances, remarkably so, has been done. The insect is not exterminated, it is true; but there seems every reason to hope, judging from what has been done and the behaviour of the species in other countries where it was once alarmingly abundant, that this is possible if money be supplied and if it be given at the time when it can be made use of to the best advantage. On pages 38 to 93 of the report will be found an instructive account of the constant efforts of the committee to get funds to carry on the work properly, and year after year it was the same story of reduced, and what was almost worse, delayed, appropriations, resulting in the necessity of modifying the whole plan of work arranged for the year; so that instead of making vigorous efforts for the extermination of the insect, and fighting it at the time this could be most effectively done—early in the season when the caterpillars were small—all that could be done was to try and prevent the further spread of the enemy from the localities known to be infested. The appropriations which have been made for this work are considerable, about \$525,000 up to the present time, and this amount would certainly have produced far better results could the committee have obtained the grants

at the time they required them, so that they could have begun the work early in the season and continued employing, from year to year, those assistants who had been taught, at an expense of much time and trouble, what was required of them.

J. FLETCHER.

Mittheilungen aus dem Roemer-Museum, Hildesheim. No. 6.—Juni, 1896. DIE SATURNIIDEN (Nachtpfauenaugen), von A. Radcliffe Grote, A. M.

This paper of 28 pages is illustrated by three plates and eighteen cuts. The illustrations are from photographs of living moths and are remarkably fine. The author defines the superfamily Saturniides and gives a table separating the families and a number of genera. The value of this table is unfortunately vitiated by the curious spacing, which renders it practically impossible to follow it.

The Saturniides are divided into two families, and each of these into three subfamilies. The Endromidæ, Bombycidæ, and Lacosomidæ are shown not to belong to the group, principally on larval characters. The relations of the Sphingidæ are also briefly discussed. Following are remarks on parthenogenesis and hybridization in the group, a discussion of the subfamilies adopted, geographical distribution, nomenclature, certain corrections to the author's previous paper on the Apatelidæ, and a list of European and North American Saturnians.

No fault is to be found with the classification which the author has worked out, regarded as an artificial grouping. A certain character of venation is selected (position of vein IV₂ on primaries) and the groups referred strictly by this character. A natural classification, which should combine several such special ones, is not attempted. As compared with the reviewer's classification on larval characters, the position of the groups represented by Hemileuca and Aglia are transposed. Mr. Grote must, therefore, suppose that the larva of Aglia is derived from a Citheronia type independently of the Saturnia branch. The larva should have re-acquired the pair of anal tubercles which are already entirely lost in Citheronia, and lost the unpaired tubercle on joint 13. He must also suppose that the stinging spines have been twice separately evolved in the group. On the other hand, to reconcile his grouping with mine it is only necessary to suppose that vein IV₂ has moved toward IV₁ in Hemileuca separately from the types of Attacus and Saturnia, where this process is congenital.

HARRISON G. DYAR.

Mailed October 2nd.

The Canadian Entomologist.

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No. 11.

BUTTERFLIES TAKEN AT ORILLIA, ONT.

BY C. E. GRANT.



FIG. 93.

I have been collecting Lepidoptera in Orillia and its vicinity for over thirty years, off and on, and thinking that it would be of interest to my brother collectors to have an idea of the fauna of this district, I send you a list of the diurnal Lepidoptera taken by me as far as identified.

Danaus archippus.—Common from June 5th to October.

Argynnis atlantis.—Common from June 4th to August.

" *cybele*.—Common from June 16th to August 31st.

" *aphrodite*.—Not so common, from June 23rd to August. One specimen of *Argynnis* taken by me presented a very dark appearance, nearly black, on the basal portion of the wings, with a greenish tinge on the outside edge of dark base, supposed to be a melanic female of *cybele*.

Argynnis myrina.—Common; two broods, June and August.

Phyciodes tharos.—Forms *marcia*, *morpheus* and other varieties common May 24th to July.

Phyciodes nycteis.—Fairly abundant; one brood in June.

" *Batesii*.—One specimen taken in July.

Grapta interrogationis.—Forms *umbrosa* and *Fabricii* common. There are three broods here.

Grapta comma.—Forms *dryas* and *Harrisii* both fairly common.

" *progne*.—Common all the season.

" *gracilis*.—Two specimens taken in July on *Asclepias*.

" *faunus*.—Rare.

" *j. album*.—Common some seasons in September.

Vanessa antiopa.—Common.

Vanessa Milberti.—Common. I think there are three broods.

Pyrameis atalanta.—Usually common in spring. This year remarkably abundant in first week of August. Saw hundreds on August 6th; took six at one sweep of the net; since then have not seen one.

Pyrameis huntera.—Not uncommon in August.

" *cardui*.—Generally common. Have not seen any this year up to this date, August 31st.

Limenitis arthemis.—Not very common in June. Very few this year, but of remarkably large size.

Limenitis disippus.—Moderately common. Second brood in July and August in low lands.

Debis portlandia.—Two specimens taken near Coldwater, on Matchedash Bay, in August, 1883.

Neonympha canthus.—Common in low meadows in July.

" *eurytris*.—Very common in open woods in June.

Satyrus nephele.—Taken occasionally in July. Not seen of late years.

Thecla acadica.—Usually three or four in a season in July. Very plentiful this year. Took forty specimens.

Thecla titus.—Also common this season; usually rather scarce in July.

" *strigosa*.—Have taken one or two every season in July.

" *calanus*.—Rather rare in July.

Feniseca tarquinius.—Moderately common through the season in one locality.

Chrysophanus thoe.—Also very local, but not uncommon when their habitat is known. Two broods, end of June and end of August.

- Chrysophanus hypophleas*.—Common all the season.
- Lycæna pseudargiolus*.—*Lucia* very common in April and May. *Neglecta* not so abundant in July and August.
- Pieris oleracea*.—Spring type common in April and May. Summer form also. Have also taken *virginiensis*.
- Pieris protodice*.—Common years ago. One male taken last year in August.
- Pieris rapæ*.—Everywhere abundant.
- Colias eurytheme*.—Common in 1872; not seen here of late years.
- " *philodice*.—Abundant. Also albinic female occasionally.
- Meganostoma cazonia*.—Quite common this year from June 6th to July 13th. Only one specimen taken before, about thirty years ago.
- Papilio turnus*.—Generally common in May, June and July; scarce this year. Have taken a specimen of a melanic male similar to one figured in CANADIAN ENTOMOLOGIST some years ago by Dr. Fletcher. (Fig. 23.)
- Papilio æsterias*.—Formerly rather common; now scarce.
- " *cresphontes*.—Has been taken in Orillia, but not by myself.
- Pamphila zabulon*.—Forms *hobomok* and *pocohontas* common in May and June; one brood.
- Pamphila mystic*.—Common in June and August; two broods.
- " *cernes*.—Very abundant in June. Second brood scarce in August.
- Pamphila peckius*.—Also common; taken in June and end of August.
- " *metacomet*.—Rather scarce in July.
- Nisoniades juvenalis*.—Not uncommon in May and June.
- " *icelus*.—Not uncommon in May, June and July.
- " *briso*.—Scarce; two or three specimens.
- " *lucilius*.—Scarce.
- Eudamus pylades*.—Abundant end of May and June.
- " *tityrus*.—Not abundant, in May, June and July; and a specimen which I take to be *Eudamus bathyllus*, but of which I am not sure.
- Pholisora catullus*.—Taken sparingly in June.

This comprises all the local diurnals which I have found in this district, except one or two species of *Pamphila* which I am unable to identify, making fifty-three or fifty-four species. I have about 200 species

of Noctuidæ and 100 or so of Geometridæ, etc., but having had no chance of seeing other collections, from the present state of literature I cannot identify a great number.

I should like very much if some of your readers could give me the life-history of *Brephos infans*, particularly as to the time of flight. I have taken this rare moth when a boy, and knew enough to mention that it was caught "at birch trees in May," but neglected to note whether it was day or night, and I cannot remember now. I have several other rare captures, and some day might report them if you think it would interest your readers.

[NOTE.—*Brephos infans* is a day flier, and from its irregular flight, as well as its colour, is very difficult to follow. The larva feeds on birch.—ED.]

NOTES ON THE PREPARATORY STAGES OF EREBIA EPIPSODEA (BUTLER).

BY H. H. LYMAN, MONTREAL.

In Part IX. of the 3rd series of Edwards's Butterflies of North America is given a very full and beautifully illustrated history of this species from the egg to imago; but as I have bred this species during the summer of 1895, through all its stages, and as the life-history, as worked out by me, differs in certain important particulars from that recorded by Mr. Edwards, I think it advisable that I should give my experience in the rearing of this very interesting species.

On 4th of July I received from Mr. J. A. Guignard, Assistant Botanist and Entomologist of the Central Experimental Farm at Ottawa, a number of eggs which had been sent to Dr. Fletcher by Mr. T. N. Willing, of Olds, Alberta; Dr. Fletcher having left for an extended trip through the Northwest Territories and British Columbia. The eggs were hatching when received, and their colour could not, therefore, be ascertained. They had been sent on 24th June, and the egg period, supposing them to have been laid the day before they were mailed, would be, thus, 11 days. No intimation was given me as to the species, but I afterwards received from Mr. Guignard a specimen of *E. Epipsodea*, which had been sent along with the eggs, and was doubtless the one that laid them.

Egg.—Height, 1.06 mm.; diameter, .89 mm.; very much of the general shape of that of *C. Jutta*, as figured in Scudder's Butterflies of New

England, pl. 64, fig. 2. Slightly widest at one-third from base. Ribs about 22-24, well marked, but not very prominent, and with many cross ribs, as in Scudder's figure of that of *Satyrus Alope*, fig. 3 on the same plate.

Young Larva.—Head large, pale brownish, pitted with many small depressions, which are darker, and ornamented with a number of brown spots, which are arranged as follows: four on the summit, two near together towards the front, and two further apart behind, below these a row of six, and a few minute ones lower down; the ocelli black.

Body.—Length, 2.5 mm.; pale in colour, with a dorsal, three subdorsal, a lateral, and a subspiracular stripe of brown. Second segment has about ten minute tubercles in a row, some smaller than others, and one on each side in the subdorsal region in advance of the row. On each segment, from 3rd to 12th, inclusive, there are six small tubercles above, arranged $\overline{\cdot} \mid \cdot$, and also several smaller ones on each side rather low down. All the segments except 2nd and 13th are divided by three transverse wrinkles.

On 10th several were seen to be swollen for first moult, but others continued to feed. On 12th ten were counted, and all but one seemed ready for first moult. In the evening one was seen to have passed the moult, several more passed on the 13th, and by the 14th all in sight had passed the moult, the average length of first stage being thus nine days.

After First Moult.—Length, 4.7 mm. Head rather large, exceeding the 2nd segment, brownish-green. Body tapering pretty evenly to anal extremity, which now terminates in two blunt points, as stated and figured by Edwards. The head is pitted as before and covered with clubbed tubercles. The body tubercles are very numerous, short, curved towards tail, and slightly clubbed. Towards the tail they get longer and are hardly clubbed. I could not discern any difference between those on the 2nd and 3rd segments. The tubercles are translucent brownish-green or pale in colour, and spring from brown spots. Body pale yellowish with a tinge of green. There is a dorsal stripe of dark brown, and a subdorsal and two lateral brown stripes, the lower being just above the spiracles. The next one above is wider than the others and diffuse on lower side. Spiracles are dark brown or black. The basal ridge is yellowish, and below it there is on the 5th to 12th segments, inclusive, a brown oblong spot, described by Edwards as a continuous stripe. Venter and prolegs brownish-green, speckled with brown dots; feet greenish.

Length of second stage about nine days.

On 21st July one was found to have passed second moult.

After Second Moult.—Length at rest, 7.8 mm. Processes innumerable. Shape as before, tail as before; head as before, very rounded, exceeding the second segment, light horn coloured, translucent, much pitted. Colour of body, yellowish-brown. A strongly marked dark brown or black dorsal stripe, bordered with creamy colour, three brownish lateral stripes, the upper one light brown, the middle one dark brown with a light brown shading below, the lowest one light brown and very little separated from the shading of the middle one. Spiracles small, ringed with brown. Subspiracular ridge strongly marked and below it a dark brown stripe. The sockets of the prop-legs and feet margined with brown. Venter, prop-legs and feet of same light horn colour as above, the feet and legs speckled with brown dots.

On 31st July one which had lagged very much was found partly past second moult, but dead; one still lingered, not having moulted; several were nearly ready for third moult. On 2nd August one was found just past third moult, and the second moulted on the 3rd.

Length of third stage was thus about twelve days.

After Third Moult.—Length, 11.46 mm. Edwards says .38 inch. Colour is greenish-brown, and the only difference I could see was that the upper lateral or subdorsal stripe is darker than before. The third larva moulted soon after 3rd August, and the fourth on 8th August and fifth on 13th August.

After third moult they increased very rapidly in size and became very plump, as I supposed, preparatory to hibernation, as Edwards described four moults, but I soon recognized that they must be about to pupate.

Mature Larva.—Length, 20.3 mm.; pale greenish-horn colour; tapers to both ends.

Head rather small, pale horn-colour, thickly and minutely pitted with brown. Dark brown dorsal stripe, bordered with creamy colour. The other stripes rather faded out and indistinct. Rather more than half way to the spiracles there is a creamy stripe margined below with brown and with a slight brownish atmosphere above. The spiracles are dark brown and very small; and just above them there is a pale creamy line. The subspiracular fold is strongly marked, but the dark line below it has almost disappeared and is only represented by a slight shading. Before

pupation the larva becomes of a rather dirty greenish-white colour, very plump, especially about the middle. The larva, when contracted for pupation, lies curved on its back among the grass without any attempt at spinning silk, just as Edwards figures it. First one pupated 15th Aug., the second on the 17th, the third on the 18th, the fourth failed to pupate and died, the fifth pupated on 29th.

The fourth stage was thus from thirteen to sixteen days.

Pupa, when first formed, is of a creamy colour, very similar to that of the grub of a *Tachina* fly when it has just emerged from the body of its victim before it contracts and hardens into the puparium. The brown markings appear in the course of an hour or two, and the description is then as follows:—

Pupa.—Length, 11.7 mm. Pale horn colour, streaked and spotted with dark brown; cylindrical; abdomen stout, conical, with a slightly curved, pointed tip. The abdominal segments are margined with brown, especially at the sides, and are also spotted with brown. The spiracles are orange. There are brown stripes in the interspaces of the wings, and the antennæ, tongue and feet-cases are also marked with brown.

The first pupa was seen to be black, and the wing markings showing on 27th Aug., and it emerged early on the 28th, and was a ♀; the one that pupated on 17th gave the imago, a ♀, on 29th; the one which pupated on 18th gave the imago on 30th, and the one which pupated on 29th Aug. gave the imago on 9th Sept.

The pupal period thus varied from thirteen to eleven days.

The average of the first three gives a period from oviposition to imago of from sixty-eight to seventy days.

The points in which my observations chiefly differ from those of Mr. Edwards are:—

First: As to the egg which Mr. Edwards describes as having thirty-five ribs, while my count gave in one case twenty-two and in another twenty-four, it was impossible for me to get all the eggs which I had into a position where the ribs could be counted, but I thought that two out of about a dozen should yield a fair average. It is true that there is variation in the number of ribs in the same species and even in the same individual, but the difference between twenty-four and thirty-five seems hard to account for.

Second: Edwards describes four moults, the larva hibernating after either second or third moult,

I think it quite possible that when the larva hibernates there may be a fourth moult, and it is probable that those of mine which completed their changes in one season had their stages hastened by being reared under more southerly conditions. Several of my larvæ fed comparatively slowly after third moult, as though trying to hibernate, but most of them died. The last was sent to Dr. Fletcher to see if he could carry it over the winter successfully, but it perished.

There can be no doubt of the accuracy of my observations, as I had only a few larvæ, which were under constant observation, and I preserved the cast faces, which give measurements as follows, according to the micrometer eye-piece of my microscope: 8, $12\frac{1}{2}$, $18\frac{1}{2}$, 28. These reduced to millimetres and decimals are as follows: .666, 1.041, 1.542, 2.333. As the faces were not of the same individual, but were simply taken at random from all those preserved, the measurements come as close to the theoretical progression as is to be expected.

I wrote to Mr. Willing to ask if he had ever noticed a second flight of *Epipsodea* at Calgary, as I thought it possible that there might be at least a partial second brood, but he replied that he had never noticed any such flight. Finding my experience so different from that described by Mr. Edwards, I consulted all the literature at my command to see if I could obtain any light on the questions of the normal number of ribs in the eggs and of moults in the larvæ of this genus, but with absolutely no success.

AELLOPOS TITAN (CRAM.).

In the CANADIAN ENTOMOLOGIST, Vol. XXIII., p. 41, Mr. Moffat records the capture of the above rare moth at Grimsby, Ont., and adds that it is possibly the only Canadian specimen in the country.

Another Canadian specimen of this visitor from the tropics was taken about four years ago at Cushing, P. Q., a village in the Ottawa Valley, not far from Lachute.

This specimen is now in my collection, and seems to be unusually large, expanding 2.6 inches. The discal spot of primaries is quite distinct. The transverse straight, whitish band only extends half across the wings, and consists of three rectangular spots, and the submarginal band consists of five large lunules. The terminal space is slightly paler than the rest of the wing, and there is no trace of the spots or bands.

Westmount, P. Q.

A. F. WINN.

THE GYPSY MOTH IN MASSACHUSETTS.

[A discussion on the work of its extermination, at the eighth annual meeting of the Association of Economic Entomologists, Buffalo, August 22nd, 1896.]

REPORTED BY A. H. KIRKLAND.

At the eighth annual meeting of the Association of Economic Entomologists, held at Buffalo, August 21st and 22nd, 1896, a part of one session was devoted to the consideration of the work of exterminating the gypsy moth in the Commonwealth of Massachusetts. The subject was presented for discussion by the President, Prof. C. H. Fernald, at the morning session of the second day. Prof. Fernald referred to the action of the Association at its Springfield (1895) meeting, and stated that at the legislative hearings of the past spring, held with reference to determining the size of the appropriation to be granted for continuing the work of exterminating the gypsy moth, no representations made by the Gypsy Moth Committee, the Director, or himself, carried a fraction of the weight that the endorsement of the Association afforded. The legislators recognized the Association as a body of eminent scientists, and accordingly valued the opinion of its members.

In speaking of the present condition of affairs brought about by the failure of the Legislature to provide sufficient funds for the continuance of the work in the most approved manner, the Professor stated that future action must be along one of three lines :

(1) To continue the work with a view to *extermination*. This can be done, but will involve a vast outlay.

(2) To attempt the *control* of the insect, but with no idea of its ultimate extermination. This means a great annual expenditure that must be continued indefinitely.

(3) To abandon the whole work, "let the insect spread at its own sweet will," and trust to the property owners to care for their own estates. Should this latter course be adopted, it would be impossible to say how long a period of time would elapse before the pest would spread over the whole of New England and into adjacent territory. The insect is now in a condition to spread rapidly through avenues of traffic, and its diffusion over the whole country would probably be a matter of comparatively short time.

The committee in charge, and those directly connected with the work, have been criticised because the importation of parasites has not been attempted. This, the Professor explained, had not seemed wise while the work has been carried on with a view to extermination, since

the latter condition involved the destruction of all large colonies wherever they occurred, and would thus prevent the successful breeding of parasites. Such insects would require the most favourable conditions in order to become acclimatized, and this would necessitate the preservation of large colonies of the gypsy moth as food for the parasites. Should the work of extermination be abandoned, a careful study of the natural enemies of the gypsy moth in its native home would be advised.

At the request of Professor Fernald, Director Forbush gave an account of the progress made in the gypsy moth work and its present condition. He said that when this insect, which was introduced into Massachusetts more than twenty-five years ago, first became seriously destructive, a commission was appointed by the Governor to "prevent its spreading and secure its extermination." This commission found that the territory infested by the moth was much larger than had been supposed. The commission was superseded the next season by another, which in a short time was abolished, and the work was then turned over to the State Board of Agriculture.

The work was begun under a grave misconception of the amount of territory infested. As soon as the State Board assumed the direction of the undertaking, it was found that the infested territory extended, not, as believed by the first commission, over a small and well-defined area, but, instead, over some thirty cities and towns. The size of the infested territory as considered by the first commission, compared with the actual area later found to be infested, was very aptly illustrated by the comparison of the size of a silver dollar with that of a broad-brimmed hat.

With a region of two hundred and twenty square miles to be examined and cleared of the moth, the appropriations made the first two years proved entirely insufficient to do more than to destroy the larger swarms of the insect and clear them from a few of the towns on the periphery of the region. The two years' work demonstrated, however, to those in charge that the moths could be cleared from any given territory provided ample appropriations could be secured to organize, equip and train a sufficient force of men. The season of 1892 was rather unfavourable for the multiplication of the moths, and so much progress was made during that year that ten towns appeared to have been entirely cleared of the moth. The committee in charge of the work believed the time had come to strike a decisive blow. The Director and the Entomologist went carefully over the ground and estimated the cost, recommending in their

report to the committee that a large appropriation be granted by the Legislature for immediate use. The Legislature cut down the estimates for the appropriation, and granted only one hundred thousand dollars. Thus the best opportunity in the history of the work was lost. During the past three seasons the meteorological and other conditions seem to have been particularly favourable for the increase of the gypsy moth, and no such favourable opportunity for its complete extermination has offered as was presented in 1892. From that time until the present, although large sums have been annually appropriated, aggregating altogether more than half a million dollars, each appropriation has been far less in amount than the immediate necessities of the work required, and each has been granted so late in the season that it has been impossible to accomplish the desired results. This ineffective legislation has been, no doubt, the result of an organized opposition on the part of those who do not believe in the possibility of extermination. Considerable opposition has come from farmers, people who are benefited, perhaps, more than any other class by the policy of the State in making appropriations for this purpose.

Many of the worst swarms of insects have been entirely exterminated, and the work has been so effectively done in most of the outer towns of the infested region that the moth has been cleared from these towns so far as careful inspection could determine. But during the present year, the appropriation having been delayed nearly six months, the caterpillars in the central towns hatched and became again somewhat generally distributed over the region, thus reinfesting some of the places originally infested and also originating new colonies.

Few moths have ever been observed outside the region found infested in 1891, except in one or two isolated localities, and all the moth colonies found since 1891, outside these thirty towns, had evidently been in existence for several years when discovered. None have been found at a distance from the infested towns. Since work was begun the present year the progress made has been very encouraging. The numbers of the different forms of the moth found this year have so far been much less than those found in 1895. No moths have been found in the extreme north-easterly towns, such as Danvers and Marblehead, and very few have been found in Lynn, a city which formerly had more than twelve hundred infested localities.

Mr. Forbush expressed a desire for information concerning the death of trees from defoliation by insects.

Prof. J. B. Smith inquired whether or not the infested territory had been reduced.

Mr. Forbush replied that the chief reduction had been made on the outside, but that many colonies had also been exterminated in the centre of the region. The greatest progress was made during the first and second years of the State Board work. There had been cases of re-infestation of "exterminated" territory from larvæ brought from the infested centre.

At the request of Prof. Fernald, Mr. Kirkland spoke briefly of the experimental work of the past year. He stated that two main lines of investigation had been followed: experiments with insecticides and the study of natural enemies. In conjunction with the chemist who prepared the compounds, a large series of arsenical preparations had been tested. Experiments with Paris green and correctives to prevent burning gave negative results. Sulph-arsenates did not give results superior to arsenites. Experiments with arsenite of lead versus arsenate of lead had shown the two poisons to be about equal in insecticidal properties. The former is somewhat heavier than the latter, and does not stay in suspension as well. The experiments with barium arsenate had already been described.

Of the few hymenopterous parasites taken, *Pimpla pedalis* and *P. tenuicornis* had been reared in small numbers from *Porthetria dispar*. The first brood of these insects attacks the *Clisiocampa americana*, and the second brood emerges in time to prey somewhat on *P. dispar*. The work on life-histories of the predaceous beetles had been carried out by a man especially detailed for the purpose, Mr. A. F. Burgess, and much valuable information obtained.

Many predaceous Heteroptera of the genera *Euschistus* and *Podisus* had been reared and studied by Mr. Kirkland, and many doubtful points in their life-history cleared up. These insects when emerging from their hibernating quarters attack the larvæ of the tent caterpillar, *Clisiocampa americana*, in great numbers.

The Japanese parasite of the gypsy moth had been received from Rev. H. A. Loomis, Yokohama, but the cocoons of the parasite were infested by a secondary parasite. Only a few of the primary parasites were alive when received, and these died without attacking gypsy moth larvæ ("enfeebled"). This Japanese parasite would be worthy of careful study should the work of exterminating the gypsy moth cease. The

experimental work of the Gypsy Moth Committee has suffered from the effects of the same shortsighted legislative policy that has hindered the progress of field operations. Mr. Kirkland pointed out that often the expenditure of a small sum in experimental research gave valuable results, and regretted that the experiments on the gypsy moth had been made to suffer from lack of funds.

In discussing the above remarks, Prof. A. D. Hopkins highly commended the good work that had been done in destroying the gypsy moth, but expressed the opinion that extermination would not be accomplished, owing to the lack of financial support on the part of the Legislature.

Prof. J. A. Lintner advocated the advisability of extermination, and stated that it was his opinion that if the State would grant sufficient funds, extermination would be accomplished. He thought the time had come when Massachusetts should be aided by the financial support of the National Government. He contrasted the action of the Government concerning the Rocky Mountain locust invasions with its present inaction as regards the gypsy moth. National support would also inspire the Massachusetts people with more confidence.

Dr. James Fletcher spoke in very flattering terms of the success in extermination thus far obtained, and of the value of the special report on the gypsy moth to entomologists in general. This book he considered would be an invaluable work of reference for economic entomologists.

He had been in the infested region twice and knew that the work had been well done, and this in spite of difficulties arising from insufficient means. In answer to a question by Dr. Fletcher, Mr. Forbush made a more explicit statement concerning the progress of the work and the conditions governing the same. He cited the case of the city of Lynn, where over one thousand colonies of the gypsy moth had been exterminated.

Dr. Fletcher suggested that the Association should give formal expression of its opinion regarding the attempt being made by the State of Massachusetts to stamp out this pest.

Prof. J. B. Smith stated that New Jersey devoutly hoped that the insect would be kept within its present domain, and offered resolutions commending the work already accomplished by the State of Massachusetts, and urging the continuance of the same, with liberal financial support.

Prof. F. M. Webster seconded Mr. Smith's resolutions, and the same were carried by a unanimous vote.

NEW SPECIES OF *NOMADA* AND *CHYPHOTES*.

BY T. D. A. COCKERELL, MESILLA, N. M.

The two following descriptions were intended to be included in articles discussing at some length the *Nomada*, spp., of New Mexico, and certain Mutillidæ; but poor health having caused these to be indefinitely postponed, the descriptions are presented herewith.

Nomada gutierrezia, n. sp.—♀. Length, 7 mm.; stout, ferruginous with cream-coloured markings. Pubescence practically confined to a slight hoariness around the bases of the antennæ, on pleura, on metathorax (except enclosed portion), on legs, and the hindmost half of the abdomen. Head considerably broader than long, face flat, punctures close on front and vertex, more sparse on face; lower margin of clypeus forming a slightly raised rim; mandibles dark at tips, with an obscure pale yellow spot near base; ocelli on a dark patch, closer together than the diameter of either; pale face-markings confined to a broad cream-coloured stripe on each side, extending from (but not on to) the clypeus to a short distance before the summits of the eyes, broadest at its lowest end. A small light spot behind each eye at the top. Antennæ ferruginous, with the flagellum becoming blackish; first joint of flagellum about as long as second and third together; second and third about equal. Mesothorax and scutellum with very large but not particularly close punctures, scutellum distinctly bilobed; enclosed space of metathorax bare, very minutely lineolately sculptured. Tegulæ shining, sparsely punctured, apricot colour. Hind border of prothorax, tubercles, oval spot on hind part of pleura, scutellum except a dark central shade behind, and postscutellum, cream colour. A small yellow spot also immediately in front of each anterior angle of scutellum. Legs ferruginous, a creamy dot at end of hind tibiæ, and line on first joint of hind tarsi. Claws very deeply cleft. Wings hyaline, with a fuliginous shade commencing along basal nervure, extending through the upper part of the first discoidal cell, all the submarginals and the marginal, darkening at the end of the marginal, and ending in a large suffused apical shade, between which and the third submarginal is a clear space. Nervures piceous, stigma ferruginous. Third submarginal cell narrowing more than half to marginal. Abdomen very finely and closely punctured; first segment with a creamy band, about twice as wide at sides as in middle; second segment with a creamy band, as narrow in middle as that on first, but rapidly widening laterally, where it is at least twice as broad as that on first. Third segment with a cream-coloured spot on

each side; fourth with a band, hidden by the overlapping third segment; fifth with a broad band. Apex with a fringe of dark hairs. Venter ferruginous, immaculate.

Hab.—Mesilla Valley, New Mexico, about a mile south-east of the Agricultural College, on *Gutierrezia sarothra*, var. *microcephala*. October 5, 1895.

Apparently nearest to *N. zebrata*, Cress., but differs by the immaculate venter, etc. Mr. E. Saunders remarks (in litt.) that in the European *Nomadæ* the first joint of the flagellum is generally extremely short, often scarcely visible. This seems not to be usual with our species.

Chyphotes mirabilis, n. sp.—♀. Length, about 11 mm.; head rounded, about as big as anterior part of thorax; eyes hemispherical or bean-shaped. Antennæ gradually tapering to a very fine point, scape stouter than flagellum, funicle hardly apparent. First joint of flagellum half length of second. Mandibles with a small tooth within. Maxillary palpi 5-jointed; labial palpi apparently 3-jointed. Thorax narrow, deeply constricted in middle, hind portion longest. Intermediate tibiae with two spurs. Tarsal joints tipped with whorls of spines. Abdomen shaped much as in *Photopsis*, first segment rounded, its suture with the second deeply constricted, its base rapidly attenuate to a narrow petiole. Surface of abdomen with close shallow punctures, becoming subcan-cellate. Colour dullish chestnut-red, tips of antennæ darkened, tarsal spines black, tibial spurs dull white. The head and the anterior portion of the thorax are densely covered with appressed pale golden pubescence, on dorsum completely hiding the surface. Intermingled with this are a few erect black hairs. Remaining parts of the body visible, some sparse pale pubescence on sides of hind part of thorax, on legs, and sides of abdomen; hind coxæ with a small patch of dense pale pubescence, hind margin of first abdominal segment broadly but irregularly covered with silvery hairs, hind margin of second segment with a pair of silvery hair patches, overlapping third; and the same, less developed, on hind margin of third. In addition to the above, there are everywhere sparse erect black hairs, which are more abundant at the sides of the abdomen towards the tip.

Hab.—Mesilla Valley, N. M. One on campus of the Agricultural College, July, 1896.

I have given generic as well as specific characters in the description, as this remarkable insect may form the type of a new genus, or at least a subgenus.

A. A. A. S.

ENTOMOLOGY IN SECTION "F," BUFFALO MEETING.

The interest in Entomology at the Buffalo meeting of the American Association for the Advancement of Science was fully up to the standard of former years. Two days preceding the date of meeting — Friday and Saturday, August 21st and 22nd — were fully occupied in the reading and discussion of papers by the Association of Economic Entomologists. The entomological papers assigned to Section "F" were arranged to be read the first day of papers (Tuesday), and nearly the whole day was thus occupied. The following entomologists were present at the sessions of the Section: L. O. Howard, C. L. Marlatt, F. M. Webster, J. A. Lintner, Jno. B. Smith, A. D. Hopkins, E. P. VanDuzee, C. W. Hargitt, Jas. G. Needham, Agnes M. Claypole, and D. S. Kellicott.

The papers read are briefly summarized below :—

1. Dr. L. O. Howard, United States Entomologist, read a paper on the entomological results of the exploration of the British West Indies by the British Association for the Advancement of Science, detailing the steps by which this important investigation had been brought about and summarizing the results of the different papers which have been published since the beginning of the investigation. He eulogized the British Committee for its conception of the work and the liberality with which it has been carried on, showed the importance of the results so far achieved, and made a plea for the association of entomologists with scientific expeditions in this country, and for the close collecting of insects, which has apparently been heretofore considered as of less importance than the collection of higher animals and plants.

After discussion by Dr. Theodore Gill, in which he pointed out that the West Indies were not islands in a faunal sense, but parts of South America, etc., simply separated by narrow channels of water, the same author read the second paper.

2. "A Case of Excessive Parasitism."—He described in some detail the facts concerning the rearing of one hundred and twenty-seven specimens of six species and five genera of Chalcididae from the Lecanium scales on a twig of *arbor vitæ* received from Ottawa, Can.

3. "On Life Zones in West Virginia."—A. D. Hopkins detailed the work in mapping the life zones in the mountains of West Virginia. The paper was discussed at length by Dr. Smith, Dr. Lintner, and Dr. Howard. It was elicited that very much careful work in the line of the



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AGROTIS SUBGOTHICA, HAWORTH.

paper remains to be done before the maps can be more than tentative. Dr. Smith called attention to the fact that the geological formations often mark sharp transitions in the distribution of insects and also in life histories. He cited the fact that on one border of a certain formation in New Jersey the elm-leaf beetle and codling moth are single-brooded and on the other double-brooded.

Dr. Howard called attention to the fact that locality labels by States were unreliable for West Virginia.

4. A fourth paper by F. M. Webster, entitled "Warning Colours, Protective Coloration, and Protective Mimicry," was read and discussed at length.

The paper treated of cases among insects where a species unarmed and in no way capable of protecting itself, was, to a certain extent, protected by its resemblance to armed species, or such as are known to be distasteful. Others, by their actions, mimicked the movements of certain other species, and were thereby mistaken for such as are inedible. The ground was taken that birds, after learning that certain insects were not fit for food, would shun any other insects appearing like these, wherever they might come in contact with them, even though at a different season of the year. There may be cases where one species mimics another, when the enemy has become exterminated and no protection is needed. Caution was enjoined against hasty and immature conclusions, as there is much to be learned in the matter, but facts should not be cast aside as mere coincidences when more information would enable us to push the problem to a point nearer a solution. That insects, especially, gain protection from their coloration and movements is assured, but much caution is necessary before conclusions are reached. The paper was illustrated by specimens.

5. "On the Variations of certain Species of North American Odonata," by D. S. Kellicott, was a brief study of certain of our common species. Attention was drawn to the fact that species were not always separated even by authorities in the group; that when distinct species are separated from their confrères by such very slight differences of structure and coloration it is necessary to carefully record the variations of even our commonest species. The species reported were *Enallagma carunculatum*, Morse, found in collections, until Morse pointed out its distinctness, under the label of *E. civile*, Hagen., and the Gomphines, *G. fraternus*, Say, and *G. externus*, Selys. The first was found to be in

Ohio very constant in size: abdomen, ♂ 27 mm., ♀ 27.3 mm.; hind wing, ♂ 19.9 mm., ♀ 21 mm. The postocular spots were found to vary from long, narrow, wedgy, connected, to short, ovate, disconnected. Other markings usually employed in descriptions were found to vary greatly. The superior appendages of the male were found to be constant in length compared with the tenth segment, and in pattern.

Gomphus fraternus and *G. externus* were studied by B. D. Walsh and the details and comparisons published in the *Proceedings of the Ent. Soc. of Philadelphia*, Volume II. In regard to the former he says there is no slender thorn in the vertical vesicle of the female. These the author found always present, to be long and slender, and to vary in colour between wholly black and wholly yellow. The yellow vitta on the hind femur of the female, claimed by Walsh to be a distinguishing character, was found to be present in about one-half the individuals and wholly wanting in one-fourth. In *externus* the spine of the vertex is present. It is a short, dark cone. The vitta on the posterior femur varies much as in *fraternus*. The conspicuous vitta on the ninth abdominal ring of *externus*, male, varies as follows: In about nine cases in ten it is normal; *i. e.*, extends the entire length of the segment, broad, and orange in colour; one in ten has it faint and narrow. An occasional male of *fraternus* has a similar faint vitta on nine.

In size both species were found to be exceedingly constant and larger than the measurements given by Baron de Selys. *Externus*: Abdomen, ♂ 40.3 mm. (average of ten); ♀ 39.3 mm. (average of three). Hind wing, ♂ 32.5 mm.; ♀ 34 mm. *Fraternus*: Abdomen, ♂ 36.8 mm. (average of ten); ♀ 37.2 mm. (average of ten). Hind wing, ♂ 30.9 mm.; ♀ 31.5 mm.

Other discrepancies were pointed out in Walsh's description of the female of *externus* (*consobrinus*) and a question raised as to the accepted conclusion that *consobrinus*, Walsh, is after all a synonym of *externus*, Selys.

6. A second paper was read by Dr. Kellicott, "On the Occurrence of Dragonflies in Ohio in 1896." The seasons of 1894 and 1895 were those of extreme drought. Ponds and streams went dry for weeks over wide areas. A dearth of Odonata was looked for in 1896. This has not been the case; on the contrary, there has been an extreme abundance. No species heretofore known to abound has been missed, whilst several not before noticed have occurred, widespread and numerous. It would

appear to follow that the nymphs may bury themselves in the mud and remain in the dry capsules for a long time unharmed until rains return. Cases were cited of *Diplax rubicundula* and *D. obtrusa* industriously ovipositing among the grass of a dried-up pond, and of *Lestis triangularis* ovipositing in plants in similar places.

Mention was also made of the capture of more Southern species in the Maumee Valley.

7. A valuable morphological paper was presented by Miss Agnes M. Claypole, of Wellesley, Mass., on "The Appendages of an Insect Embryo." The form used was identified as *Anurida maritima*, Guérin, and was collected under stones on the beach at Woods' Holl, Mass. It belongs to a wingless group of Insecta, the Collembola, and is the first form of the group as yet studied in microscopic sections.

The cleavage of the egg is complete, holoblastic, a character belonging to this group of insects only, all the others having central cleavage. The appearance of the appendages takes place very early, the antennæ being the first of the series; following the antennæ is a pair of very small appendages on the body segment, carrying what is well known to be the third brain segment. Behind these, the mandibles, 1st maxillæ, and 2nd maxillæ appear successively, in turn followed again by the thoracic appendages. All of these organs increase in size excepting the small pair on the third segment, which remain unchanged till the mouth-parts and antennæ have assumed almost distinctive characters. Then these small ones begin to grow as a ridge down each side of the three pairs of mouth-parts and finally form a wide platelike appendage enclosing the mandibles and second maxillæ entirely. In the adult the mouth-parts are known to be enclosed in a tube, or to be "drawn in," as the condition is usually described.

If, as is generally acknowledged, the insect antennæ are considered homologous with the first pair of antennæ of the Crustacea, a point of considerable interest is developed. The appendage of the third brain segment has been found in many insect embryos, but in all cases is a purely embryonic structure; it disappears before hatching. Among terrestrial Crustacea—the wood lice, for example—the second pair of antennæ is reduced to an extremely small size. Hence *Anurida* is an interesting form showing an insect in which the second pair of antennæ of the Crustacea is present, and functional in the adult; the function, however, is completely changed.

D. S. KELLICOTT,
Secretary Section F.

MISS G. E. ORMEROD.

It is with deep regret that we record the death of Miss Georgiana Elizabeth Ormerod, of Torrington House, St. Alban's, England, the elder sister of Miss Eleanor A. Ormerod, whose name as a distinguished entomologist is known throughout the scientific world. After several months of patiently-borne illness, she passed away on the 19th of August last, full of piety and good works, and justly esteemed and loved by all who knew her. She and her sister were each other's constant companion and fellow-worker, and each sought the other's counsel and aid in carrying out any plan of work in which she was engaged. Miss G. E. Ormerod's special studies were botany and conchology, and in the latter department she formed a large and valuable collection of shells, which she presented, a few years ago, to the Natural History Museum at Huddersfield. She was highly gifted as a linguist, and acquired an excellent knowledge of French, Italian, Spanish, and German, and was thus enabled to be of the greatest assistance to her sister in correspondence and the translation of foreign works of science. She is most widely known, however, by her remarkable talents as an artist, which were employed in the illustration of her sister's works, and in the production of a splendid series of diagrams in which are depicted a large number of the most important injurious insects in all their life-stages.

In addition to her scientific and artistic work, she devoted much of her time and means to benevolent objects, and carried out for many years, at her own expense, a system of distributing books of an entertaining and instructive character amongst the working classes.

Women of such a type are rare, and we cannot but deeply deplore the loss of this eminent Christian lady, who died at an advanced age, full of good works, performed in a most unobtrusive manner; richly endowed with intellectual and artistic talents, which she largely used for the benefit of others; always happy and cheerful in her daily domestic life; kind, hospitable, and sympathetic; ready to help all who deserved her aid and to give wise counsels to those who sought them from her.

To her sister—her life-long colleague—the loss is beyond what words can express. We can only venture to offer to her our heartfelt sympathy and our earnest wish that she may have grace and strength to endure so heavy a blow.

C. J. S. B.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in London, on the 21st and 22nd of October, when the following were elected officers for the ensuing year :—

President—J. W. Dearness, London.

Vice-President—H. H. Lyman, Montreal.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors : Division No. 1—James Fletcher, LL.D., Ottawa.

Division No. 2—Rev. C. J. S. Bethune, D.C.L., Port Hope.

Division No. 3—Arthur Gibson, Toronto.

Division No. 4—A. H. Kilman, Ridgeway.

Division No. 5—C. G. Anderson, London.

Ontario Agricultural College—Prof. J. H. Panton, Guelph.

Librarian and Curator—J. A. Moffat, London.

Auditors—J. H. Bowman and R. W. Rennie, London.

Editor of the Canadian Entomologist—Rev. C. J. S. Bethune, Port Hope.

Editing Committee—Dr. J. Fletcher, Ottawa ; H. H. Lyman, Montreal ; Rev. T. W. Fyles, South Quebec ; James White, Snelgrove.

Delegate to the Royal Society—J. D. Evans, Trenton.

Committee on Field Days—Dr. Wolverton ; Messrs. Hotson, Balkwill, Saunders, Anderson, Rennie, Bowman, Elliott, and Spencer, London.

BOOK NOTICES.

A LIST OF THE BUTTERFLIES OF SUMATRA, with especial reference to the species occurring in the north-east of the Island. By L. de Nicéville and Hofrath Dr. L. Martin. Calcutta. Reprinted from the Journal of the Asiatic Society of Bengal, 1895.

This list of seven hundred and fifty-six species of butterflies taken in a limited portion only of the great Island of Sumatra, gives one some idea of the wealth of the insect fauna in tropical regions. In a very interesting introduction the authors give a brief description of the Island, which is nearly as large as France and is bisected by the equator, and relate the difficulties that have to be surmounted in the formation of a collection of its butterflies, which can only be effected by employing natives, who have first to be taught and trained for the purpose. Dr. Martin lived for thirteen years on the Island and has thus been enabled to add very interesting notes on the distribution, scarcity or rarity, habits, season of occurrence, etc., of a large number of species. One may, therefore, open the list anywhere and find not a mere record of names, but highly interesting details regarding the butterflies. As might naturally be expected, the preparatory stages of the majority of the species are as yet unknown.

A LIST OF THE BUTTERFLIES OF SIKHIM, by Lionel de Nicéville, F. E. S., etc. Calcutta: from the Gazetteer of Sikhim. Printed at the Bengal Secretariat Press.

Probably no part of the great British Empire of India and its tributary States has been so fully explored by the collectors of butterflies as the country of Sikhim, which includes the famous health resort of Darjeeling, about 7,000 feet above the sea, on the slopes of the Eastern Himalayas. Consequently the author is able to record in this list no less than six hundred and thirty-one species, which he considers a near approach to the maximum number that can be discovered. Certainly it is a goodly number, and one hard to be realized by a dweller in these northern and much less luxuriant regions. And what splendid creatures they are, with their gorgeous colouring and infinite variety of shapes and hues. Nearly fifty species of *Papilio*s alone are recorded, and more than one hundred and fifty *Lycænida*æ, the greater number of which belong to genera that are entirely unknown to us here.

CRITICAL REVIEW OF THE SESIIDÆ FOUND IN AMERICA NORTH OF MEXICO, by William Beutenmüller, pp. 111-148, Bull. Am. Mus. Nat. Hist., VIII, 1896.

The writer of the present brief notice of this excellent paper on the *Sesiidæ* desires to call attention to the very careful work of Beutenmüller on the clear-wings and the necessity for this work which has arisen from the uncritical publications of preceding authors. It appears, for instance, that our *S. lustrans*, a species well distinguished by antennal peculiarities, has been five times the subject of new descriptions by the late Mr. Hy. Edwards, whose species are very properly reduced, as appears from Beutenmüller's studies. The name hitherto used for this species itself must, it seems, give way to *bassiformis*, Walk., described from a type in poor condition. Beutenmüller is quite correct in calling attention to the particular necessity in this group for good material from which to describe. The want, perhaps, of such material led Mr. Edwards to describe *S. rutilans* six times over. A large number of sexual determinations by Mr. Edwards are corrected by Mr. Beutenmüller, so it seems hardly possible for anyone to have worked with less judgment. The list of the clear-wings in the New York Check List was drawn up, with the rest of the list, by the writer of the present lines, who at the time merely sent the last proof to the late Mr. Hy. Edwards for his revision. Mr. Edwards added, in explanation, the two foot-notes on page 12 and signed these, and made one or two changes in his names for genera on page 11. The writer is also responsible for the list of the clear-wings, since he originally wrote the same, and not Mr. Edwards. The explanation is here given, as the list has been erroneously alluded to as the work of Mr. Edwards. In the Philadelphia list the New York list is generally copied, but *lustrans* is wrongly given to Mr. Hy. Edwards, and an implication is conveyed in the preface that Mr. Hy. Edwards was the author of the list of the clear-wings, which is here corrected. The writer trusts that Mr. Beutenmüller will continue his studies and that lepidopterists generally will help him in every possible manner. It is a matter of great satisfaction that Mr. Beutenmüller's timely work is also of such good quality. The writer would merely reclaim his *Sesia pictipes*, which is also given to Mr. Hy. Edwards, on p. 134, and draw attention to the excellent description of the habits of this species given by the late Dr. Bailey in the pages of the *American Entomologist*.

A. RADCLIFFE GROTE, A. M.

CORRESPONDENCE.

"DIE SATURNIIDEN."

SIR,—In comment upon my friend Dr. Dyar's kind notice of my classification of the *Saturniides*, I would say that I believe the stinging spines of *Hemileuca* and *Automeris* may have developed along different lines from an initiatory existence in a common ancestor. I place, therefore, the origin of these groups lower down, approximating, in my "tree," *Hemileuca* seems to me to have differentiated from the lower and primitive type (which latter is *Agliid* and has retained more of the *Tineides* characters) by the achieving of the Saturniid character of the forking of IV₁ and IV₂. This character is of the first importance and indicates the original divergence of the primitive group. In my "tree," I show by the relative heights the relative specialization of the subfamilies. With regard to *Aglia*, it does not seem to me to be necessary that the larva should have reacquired, but merely retained, the anal tubercles which have become lost in *Citheronia*. The latter is a degenerate type. In my "tree," I have carried *Citheronia* beyond the base of the *Aglia* stem, to show its independent devolution; but only a little way beyond, because, in a vertical view, *Citheronia* represents the lowest Saturnian form, retaining vein VIII., which both *Aglia* and *Automeris* have lost. I place *Automeris* higher than *Hemileuca*, which Dr. Dyar has not noticed. *Automeris* and *Aglia* are more specialized in other directions, but have retained the primitive location of IV₂. All these points have been considered in my "tree."

A. RADCLIFFE GROTE, A. M.

RARE BUTTERFLIES.

Euptoieta Claudia.—Toronto, 1893 (am not sure of month, but think I took it in July).

Libythea Bachmani.—Caesarea, 12th August, 1896.

Satyrus Alope.—Niagara Falls, Canadian side, 14th July, 1896.

Colias Caesonia.—Toronto, 13th, 20th, and 27th June, 1896. Fairly common.

Papilio Ajax.—Toronto, 27th June, 1896. Saw several specimens, but only took the one. Saw first one on 14th June.

Pieris Oleracea.—Æstiva—Caesarea, 12th August, 1896.

ARTHUR GIBSON, Toronto.

Mailed November 3rd.

The Canadian Entomologist.

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No. 12.

THE AGROTIS SUBGOTHICA OF HAWORTH, AGAIN.

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In the CAN. ENT. for November, 1895 (Vol. XXVII., 301-307), I discussed all the evidence then accessible to me in regard to the identity of this insect. According to Prof. J. B. Smith, our American authority on American Noctuids, I showed "very conclusively that *subgothica*, Haw., is correctly used for our American species" (CAN. ENT., XXVIII., 4). However, Mr. J. W. Tutt, who has written much about British Noctuids, in an opinionated reply (CAN. ENT., XXVIII., 17), tries to prove that Haworth described a variety of *tritici*, a well-known European (not an American) insect. After a careful study of several authentic specimens of *tritici*, representing nearly as many varieties, from Dr. Staudinger, and after considerable correspondence with both English and American lepidopterists who are familiar with *tritici*, I became convinced that the species, in any of its numerous variations, never approaches near enough to what Americans have called *subgothica*, Haw., to be easily mistaken for the latter; their antennæ are quite different structurally. But Mr. Tutt states: "I can match exactly the specimens which Stephens figures, and Humphrey and Westwood copy, with undoubted genuine specimens of *Agrotis tritici*." Naturally, I was anxious to see one of these specimens, and, under the circumstances, I anticipated that a request to examine one of them would be readily granted. My first polite request remaining unanswered, I wrote a second time, but, as yet, Mr. Tutt has not even replied to either request. The above facts, and especially those which follow, I think demand that Mr. Tutt publish a photographic illustration of one of these specimens of *tritici* var. that it may be compared with the figures on my plate in CAN. ENT. for November, 1895, and especially with the two on the plate accompanying this article.

The following extracts from an interesting and valuable letter, written in response to several of my queries, by one of England's most respected lepidopterists, will throw much light on some obscure points and straighten out some of Mr. Tutt's misconceptions: "Stephens's and Wood's figures

seem to me to be made from a specimen, probably from the same specimen, of genuine *subgothica* of American writers. Humphrey's figure possesses the curious character, so conspicuous in *subgothica*, of an oblique pale stripe running from the median nervure immediately below the stigma. This is curious, because no tendency toward such a marking shows itself in the varieties of *tritici*."

"Mr. Raddon, who was mentioned as the person spoken severely of by Doubleday, was a respectable gentleman, an engineer, living at Bideford, on the west coast of Devonshire. He is famous in English lepidopterous history as the discoverer of *Deilephila euphorbiae* in the larval state in numbers on some extensive sand burrows near Barnstaple. Bideford and Barnstaple are on opposite sides of the estuary of the Taw and Torridge; and from these two far-western ports extensive trade was carried on with America back to the days of the buccaneers and Sir Francis Drake. Consequently, my firm belief is that these and other American insects arrived there among timber or other produce, and naturally enough were picked up by Mr. Raddon as genuine 'Britishers'."

"I have written about Mr. Raddon to perhaps our oldest living collector, Mr. S. Stevens. He replies: 'I suspect that I am the only living entomologist who can give you any information about the late Mr. Raddon. Between 1837 and 1844, I used to meet him occasionally at the meeting of the Entomological Society, when he came up to London and brought a few of the insects that he had bred and captured. He died in the spring of 1848. I happened to be staying at Ashburton, South Devon, in August that year, and on receiving a letter from my brother, went to Bideford to see to packing up the collection, which was sold in October of that year.' Mr. Raddon was believed in then, and probably with justice. Was Raddon a collector as early as 1810? Yes, his first capture of *D. euphorbiae* was in 1806, his largest haul of it in 1814."

"There is no reason to suspect that Haworth knowingly described as British any species which was not so, but unwittingly he certainly did. It is not possible always to sift out a statement, and there were collectors then who were willing to astonish their friends with insects that they certainly had not captured. I think that this does not apply to the original specimens of *subgothica*."

Thus, contrary to Mr. Tutt's surmises (pp. 17 and 21 of his paper), Mr. Raddon began collecting insects before 1810, when Haworth described *subgothica*, and until after 1829, when Stephens wrote. It is not impossible,

then, that Haworth's material came from the same source as Stephens's. On page 22 of his article, Mr. Tutt tries to show that the specimen of *subgothica*, Haw., of American writers, found by Mr. Barrett in the old Burney collection, was not likely to have been obtained by Mr. Burney in Haworth's time. However, Rev. R. A. Burney, who was born in 1775 and died in 1836 (three years after Haworth's death), was an ardent collector of insects for 30 years. His collection went to his son, Mr. H. Burney, who continued to collect for over 30 years. It was the latter Burney who died in 1893, but the specimen of *subgothica* recently found by Mr. Barrett (Ent. Month. Mag., XXV., 223) originally came, as he distinctly states, from the collection of the elder Burney, who *was* a contemporary with—and could have and did, Mr. Barrett says, correspond with—Haworth. In regard to the Burney collection, one of England's most noted lepidopterists writes me: "To call his collection a 'scientific lie' is worthy of the person who wrote it. The vast majority of his insects were genuine enough. A few of doubtful nativity were in the collection, but he had removed the most glaring species which had been imposed upon him, and, I think, destroyed some of them."

The above facts show that there could have been and that there was at least one (Haworth himself states he had seen his species in three museums or collections)—Burney's—specimen of the *subgothica* of American writers in English collections in Haworth's time; as Mr. Raddon collected before 1810, Stephens's specimen might also have been one of those seen by Haworth. In the light of the above facts, and especially in connection with what is to follow, it would seem that Mr. Tutt's sarcastic remarks in the closing sentence on page 22 and in the first sentence on page 23 (CAN. ENT., XXVIII.), might equally as well be applied to his own arguments in this discussion; but sarcasm is not science nor logic.

I consider myself fortunate in being able to draw most of my information from English sources, for I thus escape Mr. Tutt's allegation that no American entomologist had or has the slightest knowledge of the British Noctuids. As a final argument in support of my claim that Haworth's *subgothica* is an American insect and not a variety of the European *tritici*, I have to offer a British picture, shown in the lower half of the plate. This photograph was taken by Mr. Gepp, in the British Museum, under the direction of Mr. A. G. Butler and Mr. C. O. Waterhouse. It purports to be a likeness (twice natural size) of Haworth's

original type specimen of *subgothica*! Its authenticity is vouched for by Mr. Butler in the following letter to the writer:—

“Mr. Waterhouse suggested to me that as Stephens purchased part of Haworth's collection, it was possible that the original type might be in Stephens's collection *now*. I thought it hardly probable, for the very reasons urged by yourself; but *there it is*, or at any rate a specimen labelled in Haworth's style and in his writing.

“All of Haworth's types are ticketed in the same way (note the peculiar triangular label and the printing of the name in the picture on the plate). Of course, italic writing is much alike whoever does it, but I should do it differently from Haworth [here Mr. Butler gives his style]. Old Smith, in his labels, differed again [a sample of Smith's style is here given]. In Haworth's label the *s* and *b* are the most distinctive features. I have no doubt that the Stephensian specimen is Haworth's type.

“The type of *subgothica* has a strongly pectinated antenna (see the picture), but examined through a lens this antenna is clearly seen to be glued on to the right eye. It does not belong to the specimen, which is undoubtedly identical with *A. tricola*, Lintner.

“Stephens's figure cannot have been made from Haworth's type; indeed, it is stated to have been drawn from a specimen in the possession of Mr. Raddon. Collectors were easily gulled in the days of Stephens, and doubtless anybody who cared to pay for Haworth's species to complete his ‘*British*’ collection could get something quite near enough to represent it. Stephens's figure is evidently taken from a specimen of the same species as *Feltia ducens*, Walk. (All recognize this as equal to the *subgothica* of American writers.)

“We have a whole drawerful of Haworth's types, and in every instance the labels are cut in the same peculiar way (see figure); also in every label on which the letters *s* and *b* exist they are formed precisely in the same manner. There is, therefore, not the least doubt that the specimen in Stephens's collection is the type and that *A. tricola*, Lint., must be called *subgothica*, Haw.”

As Dr. Lintner, the author of *tricola*, has kindly given me a type specimen of his species, I am able to present, in the upper half of the plate, a picture of it, twice natural size, for comparison with the picture of Haworth's type of *subgothica*. Both Dr. Lintner and Prof. Smith agree that the photographs represent insects of the same species. I think a careful study of Guenee's descriptions, and especially of his figure of

jaculifera, will show, what most lepidopterists admit, that he had three species before him, from which he deduced a type description and two varietal descriptions.

Thus, to summarize, I believe that the evidence given in and brought out by my former paper, with the new facts brought out in this communication, demonstrates beyond any reasonable doubt the following final synonymy for these three much-discussed species :—

Feltia subgothica, Haw.

triosa, Lint.

jaculifera, var. A, Gn.

Feltia jaculifera, Gn.

subgothica, of Stephens, Wood, Humphrey, and all American writers.

ducens, Walk.

herilis, Grt.

jaculifera, var. B, Gn.

FURTHER ADDITIONS TO MY 1894 LIST OF WINNIPEG BUTTERFLIES, WITH NOTES FOR SEASON OF 1896.

BY A. W. HANHAM.

Neonympha eurytris, Fab.—Two. June 23rd and 26th. Both captured in Elm Park, near the City. These specimens differ somewhat from some I have taken near Quebec City. They are also larger.

Carterocephalus mandan, Edw.—Two. June 18th and 20th. The first in Elm Park.

Pamphila hobomok, Harr.

var. *pocohontas*, Scud. Several in Elm Park, June 18th to 23rd.

The spring was a wet one and the early summer not much better, notwithstanding which this season has been a richer one for diurnals than last. Several visits were made in June and early in July to the locality where the *Phyciodes*, sp., was found in 1894, but nothing but *tharos* was seen.

Pyrameis atalanta, Linn.—This butterfly was unusually abundant here early in the season.

Limnitis arthemis, Dru.—Quite plentiful.

Debis portlandia, Fabr.—This beautiful insect was very abundant throughout the district, and especially so in Elm Park from June 26th to July 3rd (in perfection), and I even took a fine specimen in my back kitchen.

Satyrus nephele, Kirby.—The form *Boopis* occurs here.

Colias interior, Scud.—A fresh specimen taken near Bird's Hill on July 8th and a second seen.

Colias eurytheme, Bdv.—Very abundant this season from beginning of August until middle of September.

Papilio asterias, Fabr.—A worn ♀ near Bird's Hill on June 29th. No *P. turnus* noticed in the district since 1894.

Pamphila metacomet, Harr.—One. Bird's Hill, July 7th.

Amblyscirtes samoset, Scud.—June 18th. Abundant in Elm Park. Examples not very fresh.

Eudamus tityrus, Fabr.—One seen June 29th near Bird's Hill. I find this a very difficult thing to net.

On July 9th I went to Brandon, Man., for a few weeks and enjoyed some good collecting, but did not get out often for butterflies.

On July 26th and August 2nd, *Argynnis Cybele*, *Cipris*, *Lais* and *Bellona* were seen in abundance. *Colias eurytheme*, var. *eriphyle* and *Keewaydin*, were very common everywhere during my stay, and on August 2nd I captured a fine ♀ (albino).

Euptoieta claudia, Cram.—One. August 2nd. In fine condition.

Thecla titus, Fabr.—Plentiful in one locality on the prairie August 2nd. No bush near at hand.

Lycana melissa, Edw.—Occasional. July 13th to August 2nd (♂s).

Pieris protodice, Bd.-Lec.—Several taken at Brandon are in the collection of Mr. H. W. O. Boger.

Papilio asterias, Fabr.—One. August 2nd.

Thymelicus garita, Reak.—Common. Worn specimens on wing as late as August 2nd.

Pamphila manitoba, var. *assiniboia*, Lyman.—August 3rd. One (fresh), at rest on a yellow flower in the evening (♂).

A REPLY TO PROF. SMITH.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

With regard to *Mamestra comis*, the whole question as to the setting of the type has been introduced by Prof. Smith, and I submit that this has nothing to do with the matter. I have merely shown that Prof. Smith's statement that the type of *comis* was "typical *olivacea*, but so set as to make it appear differently marked," etc., is inaccurate and impossible, as my description refers to colour and marking, and these cannot be produced by any freak of setting. As I failed to notice any peculiarity of setting in my type, it is probably not very obvious, and as now described by Dr. Smith, must be very slight. I call further attention to the fact that in colour and marking the description of *circumcincta* agrees well with mine of *comis*. I believe, therefore, it possible that *circumcincta* is *comis*. I do not assert it—I have not seen the type of *comis* since the seventies—but I think it possible, nay, probable. Mr. Beutenmüller writes me that the type of *comis* differs more from "typical *olivacea*" than the type of *circumcincta* does. I want these types examined by some competent person who can settle the matter as to whether *comis* is a variety of *olivacea* or not, and what the standing of *circumcincta* really is as compared with either. That *comis* is not "typical *olivacea*" seems now virtually admitted by Dr. Smith, and this is in reality all my contention, and that no amount of abnormal setting can produce differences in colour and marking. This closes my case as to *Mamestra comis*.

Now, as to the type of *Agronoma*, which is *crassa*. If *crassa* agrees with the type of *Porosagrotis* I am glad to hear it, and we shall get a little more light into the matter. The reason I wrote that the front was roughened and tuberculate was that I felt it with a pin's point. My microscope I left behind in America, and there is none in the museum here. I could not distinguish, with the pin, between tuberculate and roughened. *Crassa* does not belong to *Carneades*, because the antennæ are pectinate, and in my opinion the structure of the antennæ offers points of generic value. I have therefore not been able to compare *Feltia* and *Agronoma* as closely as I should have liked; first, because I had no species of the former; secondly, no microscope. But the work of bringing the groups of North American *Agrotis* into correspondence with the European progresses, nevertheless, as we see. That *Feltia* should not be represented in Europe seems not likely, since Haworth's name *subgothica* is held by Mr. Tutt to represent a variety of *tritici*, by Dr. Fitch to be *jaculifera*. In a little

while I hope to get it all straightened out, and I am glad that my original proposal to separate first the species of *Agrotis* with unarmed tibiae has been adopted in his revision by Dr. Smith. I may say, in conclusion, that it is the property of all changes in the synonymy, whether proposed by me or by Prof. Smith, that they should be verified and that they are subject to examination. I have been showing reasons why some of Prof. Smith's changes are not to be followed.

A MEXICAN ALEURODICUS.

BY T. D. A. COCKERELL, MESILLA, N. M.

Aleurodicus Dugesii, n. sp.—Length, $1\frac{2}{3}$ mm.; length of anterior wing, $2\frac{1}{4}$ mm.; its greatest breadth nearly $1\frac{1}{2}$ mm. Pale grayish-ochreous, covered with white meal, abdomen beneath shining silvery. Wings white; upper wings iridescent, with markings similar to those of *A. ornatus*, but very pale gray and quite different in detail. There are four gray bands crossing the wings, of which only the third and fourth are joined by a longitudinal band. The first (basal) band bends abruptly inwards after crossing the main nervure, which branches so near the base of the wing that there are practically two nervures, the first gray band failing in the angle between them, but strong again beyond the second. Second gray band broad as far as the first nervure, just beyond it interrupted broadly, but continued as a large, nearly circular, gray patch, the greater part of which is above the second nervure, and passing thence as an oblique narrow band to the margin. Third band resembling the second as far as the first nervure, which it meets at its fork; after that failing, but reappearing strongly a little way down the lowest branch of the nervure and thence passing downwards, becoming very faint. Fourth band broad, passing across the end of the fork, bent inwards, joining the continuation of the third band after the break, itself forking at its lower end. The curve of the fourth band leaves a white apical area in which there is a gray spot. There is also a gray spot at the tip of the second nervure.

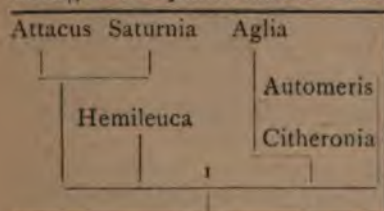
The pupæ occur on the under sides of the leaves and are of the usual type—oval, flat, pale ochreous, with white mealy powder.

Habitat.—Guanajuato, Mexico, on *Hibiscus rosa-sinensis*. Sent by Dr. Alfred Dugès in great quantity. Dr. Dugès writes that it is also found on the large-leaved *Begonia* and other plants, and it does not appear to do them a great deal of harm. It is the first *Aleurodicus* described from Mexico, and is most nearly allied to the Jamaican *A. ornatus*, Ckll. The genus now includes five species, all neotropical except the U. S. *A. asarumis* (Shimer, 1867).

NOTES ON THE PHYLOGENY OF THE SATURNIANS.

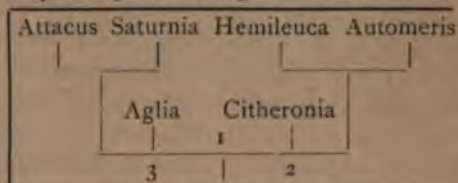
BY HARRISON G. DYAR, PH. D., NEW YORK.

Mr. Grote's remark (CAN. ENT., XXVIII, p. 294) that the stinging spines of *Hemileuca* and *Automeris* may have been separately evolved is not in accordance with my views, and I wish to compare his genealogical tree of the Saturnians with the larval characters more at length than was possible in the review of his paper, "Die Saturniiden." I reproduce first his tree: At 1 there is a dichotomous division, the genera on the right having vein IV_2 in the middle of the cell or but slightly moved (generalized);



those on the left with vein IV_2 considerably moved toward IV_1 . It is not proved that this movement of IV_2 took place only once in the Saturnians, but it is so assumed, and the construction of the tree depends upon the assumption.

Next I present a tree founded on larval characters, using the same generic types. At 1 is a dichotomous division, the larvæ on the right retaining the unpaired tubercle on joint 13 and losing those on the anal plate; on the left losing the unpaired tubercle and retaining the pair on the anal plate. At 2 is another division, the two genera above acquiring stinging spines, while *Citheronia* remains without them. At 3 the stem of *Attacus-Saturnia* acquires many haired, reduced tubercles, while *Aglia* retains the single haired primitive condition and degenerates.



A comparison shows that these two trees are contradictory, the position assigned to *Aglia* and *Hemileuca* being almost exactly transposed. Yet, if rightly interpreted, there should be no contradiction between larval and imaginal characters.

If Mr. Grote's tree is correct, *Aglia* must have reacquired tubercles on the anal plate, because it is derived from the stem of *Citheronia* after *Automeris* was thrown off, and neither of these genera possess these tubercles. Likewise, *Hemileuca* has independently lost these tubercles, unless we suppose that originally they were not present, but were acquired separately by *Attacus-Saturnia* and *Aglia*. This can not be, however, as

the tubercles are primary, not recently developed structures. *Automeris* and *Hemileuca* must have separately acquired stinging spines and not from "an initiatory existence in a common ancestor," as Mr. Grote puts it, because there is no such condition in *Aglia* or *Citheronia*, which are placed between them, nor any evidence that these genera are derived from wart-bearing ancestors, a condition necessary for the multiple spine formation. I regard these conditions as very improbable.

If my larval tree is correct, *Aglia* has remained more nearly in the primitive condition in regard to vein IV_2 in that this vein is only slightly moved toward IV_1 . Yet, it is somewhat moved, which weakens Mr. Grote's point (see the fig. *Die Sat.*, p. 19, fig. 8). *Hemileuca* has followed out the same process separately; derived from a common stem with *Automeris*, vein IV_2 has moved close to IV_1 separately from the *Attacus* branch. *Hemileuca* is separately specialized in this respect.

Some collateral evidence may help to a conclusion. If these moths be separated on the position of the wings in rest, the wings folded over the back in the shape of a roof or with the upper faces together (as in butterflies) a tree results like the larval one. In the hind wings there are two anal veins in *Hemileuca* and *Citheronia*, the rest have one. A tree constructed on these characters (which I believe to be as good as the one selected by Mr. Grote) would be different from either. To reconcile it with my tree, it must be supposed that the left-hand branch had lost one anal vein, while *Automeris* on the right branch also lost it, but separately. To reconcile it with Mr. Grote's tree, three separate losses of anal vein must be supposed, viz., in *Automeris*, *Aglia*, and *Attacus-Saturnia*. My view is here the simpler.

As to the pectinations of the antennæ in the male, those of *Hemileuca* only have simple branches; in the female only *Attacus-Saturnia* have them double. Mr. Grote may suppose that the original ancestor had single pectinations in both sexes, retained in *Hemileuca*; the right branch acquired double pectinations in the male, while *Attacus-Saturnia* separately acquired them in both sexes, which seems improbable.

In my larval tree the ancestor must have already possessed double pectinations in the male, which became transferred to the female also in *Attacus-Saturnia*, but were lost by degeneration in the male of *Hemileuca*. It is true that this supposition can also be applied to Mr. Grote's tree, so that we are not greatly benefited by the consideration. Other characters will have to be compared; but this I will leave to Mr. Grote, with the

hope that he will examine the matter thoroughly. I believe he will find that the true natural classification is not far from that which I have indicated on larval characters.

Finally, this is perhaps as good a place as any in which to protest against Dr. Skinner's remarks in a recent number of the *Journ. N. Y. Ent. Soc.* Dr. Skinner says: "I may say right here that I believe the imago the culmination of nature's efforts, and that while studies of transformations are most valuable, they will not solve the problem of specific difference or identity." This is not the view of a careful student of the subject, but reads like an excuse for neglecting studies of the early stages. As if the larva were not often the "culmination of nature's effort," as in *Apatela* or the *Limacodidae*, or as if the forces determining the struggle for existence must always impinge most strongly on the same stage in all species.

DESCRIPTION OF TWO REMARKABLE ABERRATIONS OF *COLIAS PHILODICE*.

BY DWIGHT BRAINERD, MONTREAL.

We were fortunate in taking a very peculiar pair of *Colias philodice* this summer. They were captured at Edgartown, Mass., in a little salt marsh, August 10th and 14th respectively, and, though hatched during the hot wave, we believe are blood relations — part of a sport brood.

Many specimens were examined at the time, but no other departures from the type found.

Number one is a male very similar to the melanic variety figured by Mr. W. H. Edwards on Plate III. of *Colias* in *Butt. N. A.*, second series. The colouring on trunk and appendages is normal, except that pile on dorsum is mouse-gray, the collar a more decided brick-red than usual, and the yellows, where present, match the deep chrome on wings.

When caught, the whole upper surface (with exception of a dusting of yellow on costal margin of the primaries and a pallid green-white strip on the secondaries from costal margin to and following the radius for three-quarters of its length, gradually becoming obsolete) was a deep bottle-green. On drying, the marginal bands, both wings, appeared as a slight, but uniform, reddish-purple stain, the indentations regularly lunulate, and the nervules came prominently out in dull black lines.

The spot on discal vein of fore wings is present and distinct, but a dark blotch replaces the usual orange patch on secondaries. The rosy marginal line is as in type.

Our plunder this season was all attacked by pests, necessitating a severe cyaniding. Much of the brightness in this butterfly was lost, the colour now resembling the brown leaf-green of oak trees late in August.

Scales on the under side are very heavy, there being no suggestion of a band; the extra mesial spots on primaries are almost wanting, and the general ground colour is a deep chrome. A thick daub of this paint from a good box duplicates it exactly.

On the basal half of the disk in secondaries there is a suggestion of green, and extended from that portion of the primaries covered by the lower wings when at rest, which is of the pallid hue mentioned above, nearly covering the outer half of discal cell, thence interspacing the media and cubitus to the mesial spots, from which it bends sharply to the outer angle, reaching the margin at lower branch of cubitus, there is an overwash of black. This is deepest at its inner border and curiously shaded as it blends with the chrome. The whole lower surfaces, with their bright tips and bold opaque colours, are very handsome.

Number two is a female, pallid above, like a white female, except that the black margin reaches from the discal vein, on the costal side follows the radius, joining margin at its first branch and posteriorly defines the media as far as the border. The outer portion of disk and the costal margin on primaries are more or less splashed with dark scales, while on secondaries the marginal band is only indicated by a dusting on edges of the veins.

Underneath the spots are much exaggerated. On the primaries they appear as large triangular black stains, with apices reaching further and further towards the base until between radius and media they touch the discal spot. On the lower wings this stain is ferruginous, shading to green, and practically covers the disk. The unusual size of these spots outlines a white marginal band, the distinctive feature of the specimen in question.

THE ACADEMY OF SCIENCE, ST. LOUIS, MO.

At the meeting of November 2, Mr. Colton Russell spoke of "What an Entomologist Can Find of Interest about St. Louis," illustrating his remarks by numerous pinned specimens of insects, giving particular attention to the butterflies, and speaking at some length of the phenomena of periodicity, migration, polymorphism, etc., as illustrated by these insects, his paper embodying the result of a large amount of field work performed during the last ten years. Resolutions opposing the passage of the Antivivisection Bill now before the United States Senate were adopted. Three persons were elected to active membership.

WM. TRELEASE, Recording Secretary.

NOTES ON THE LIFE-HISTORY OF CERURA
OCCIDENTALIS.

BY HARRISON G. DYAR.

These notes are to complete the partial account of the life-history given in Dr. Packard's monograph.

Egg.—As usual, hemispherical with a flat base, dark black-brown, not shining; diameter 1.1 mm., height .7 mm. Reticulations neat, distinct, rounded hexagonal, smooth, not elevated, the enclosed spaces densely coarsely granular, serving to make the smooth reticulations conspicuous. Laid singly on a willow leaf.

Stage I.—Head bilobed, rather square; red-brown, the ocelli darker; width .5 mm. Dorsum of joints 3 to 12 continuously broadly greenish-yellow, the rest of the body purplish-brown; tails darker, blackish toward the base, with two sordid white rings. Cervical horns and tails spiny. Setæ normal, i. to v. and leg-plate present on the abdomen, i. a and b, ii. a and b, iv. and vi. on thorax, vi. double, ii. b not very evident. At the end of the stage the yellow band is slightly constricted at joints 6-7 and 11, horns, cervical shield, anal plate and tails darker than the now vinous body. Head light red; abdominal feet whitish, thoracic blackish; no marks.

Dr. Packard's descriptions of stages II. and III. are comparative only, so I give my notes in full.

Stage II.—Width of head .9 mm. Medial suture deep; all red-brown, uniform, smooth, the clypeal tubercles marked by yellowish dots. Dorsum to spiracles vinous brown except a yellow patch on joints 3-5 and 7 post.-10 ant., the now dark parts of the former yellow band smoky olivaceous; subventral region and legs pale yellowish; two yellow rings on the tails. Tubercles distinct, setæ dark. Cervical horns slightly spinose; length of tails 2.8 mm. During the stage the larva suffers an entire change in markings, resulting as follows: Green, an incised dorsal brown band triangular from the horns to a slight fold on the anterior part of joint 3, elliptical on joints 4 to 11, widening to the anal plate, with a very slight retraction at the incisure of joints 11-12. A yellow patch on joints 7 post.-10 ant.

Stage III.—Width of head 1.5 mm. At first much the same as at the end of stage ii. Later head reddish-brown with many pale yellow dots over the lobes; pale behind the brown ocelli. Body bluish-green, dotted with white and yellow and shaded with white in the region of the

feet ; dorsal band light brown, scarcely yellowish in the centre of the large patch, slightly frosted with purplish, darker on the edge and with a narrow yellow border. The band is retracted at joint 4 to the slight single dorsal fold on joint 3 posteriorly, reaches the spiracle on joint 8, not conspicuously incised on the folds, retracted at joint 11 posteriorly, then nearly straight to the anal plate. Tails with two greenish-yellow rings ; horns spiny, setæ stiff.

Stage IV.—This has not been previously described. The larva which I bred to fourth stage had the proper width of head (2.5 mm.), but it exhibited smooth cervical horns and the other characters of the final stage, thus maturing with only four stages. The coloration was as described for the full-grown larva. The structures on joint 3 which Professor French calls "tubercles" consist of a fold of skin divided by a dorsal depression into two rounded humps, not bearing any setæ.

Stage V.—Other larvæ found when full-grown had a width of head of 3.1 mm., thus indicating that five stages also occur. Dr. Packard quotes Prof. French's description of this stage, which has been already published in CAN. ENT., XIII., 144.

BOOK NOTICES.

ECONOMIC ENTOMOLOGY for the Farmer and Fruit-Grower, and for use as a Text Book in Agricultural Schools and Colleges ; by John B. Smith, Sc. D. Philadelphia : J. B. Lippincott Co., 1896. (Price, \$2.50.)

It is rather remarkable, when the self-evident importance of the science of economic entomology is considered, that until Professor Smith issued his excellent manual, which has just appeared under the above title, there was no one American book which a farmer could consult to find the names and proper remedies for the common crop pests which would come regularly before him in a year's working of his land. The author, in his long experience, first as a member of the staff of the United States Entomologist at Washington, and subsequently as State Entomologist of New Jersey, has had great opportunities of becoming thoroughly informed on his subject. That he has made the best use of these opportunities is evidenced by the excellent book which he has now produced. The best way to test anything is to use it. Thus, if anyone wishes for information upon anything within the limits of economic entomology, the subject of

Prof. Smith's book, as, for instance, some one of the regularly occurring insect enemies of crops, *e. g.*, cutworms, white grubs, canker worms, the Colorado potato beetle, plum curculio, or tussock moth, etc., etc., let him turn it up in the index of this work and he will be referred to a clear and concise account of the insect and its habits, together with recommendations as to the best remedies. The identification of the different species is made easy by a profusion of remarkably good illustrations. The whole book, including the index, consists of 481 pages, while the number of illustrations is no less than 483, all of which are unexceptionable, if a mental reservation may be allowed as to the three plates of bumble bees and bee flies, Nos. 398, 464, and 473, taken evidently from photographs. It seems a pity that these plates should have been included in this work on economic entomology. They were made from very badly mounted specimens, and have no special reference to the text. The arrangement of the book, for ease of reference, is well planned and well carried out, the objects the author had in view, as explained in the introduction, being adhered to in a most satisfactory and complete manner. Part I. consists of eight short chapters on the Structure and Classification of Insects. Part II., the Insect World, which forms the bulk of the book, is a systematic treatment of the various common injurious insects in their natural orders. This portion is particularly well-balanced, enough space being devoted to each species treated of to satisfy the inquirer, without, as is sometimes the case, giving undue importance to some at the expense of others. Part III. treats of Insecticides, Preventive Remedies, and Machinery. This work cannot fail to prove of great value to the farmer and fruit-grower, as well as to the amateur gardener and student of insect life, who will find in it an authoritative book of reference of small size but comprehensive and easy to consult.

J. F.

MISSOURI BOTANICAL GARDEN — SEVENTH ANNUAL REPORT, 1896.

Very few reports are more eagerly looked for every year by those who are lucky enough to secure copies than Prof. Trelease's report on the Missouri Botanical Garden and the Henry Shaw School of Botany at St. Louis, Mo. This report contains not only the Director's annual statement on the condition of the Garden and its finances, but also valuable monographs on different genera of plants. In the present volume we find the following: (1) *The Juglandaceæ of the United States*,

by Prof. Trelease ; (2) *A Study of the Agaves of the United States*, by A. Isabel Mulford ; and (3) *The Ligulate Wolffias of the United States*, by C. H. Thompson. A feature of all these annual reports is the magnificent illustrations.

In addition to the above there is the report of a speech delivered at the sixth annual banquet, by President Henry Wade Rogers, of the Northwestern University, on "The Value of a Study of Botany," and a catalogue of the Sturtevant Pre-Linnean Library, the greater part of which was presented to the Botanical Garden by Dr. E. Lewis Sturtevant in 1892.

One very notable omission from the present volume, which we much regret, is the printing of the annual "flower sermon." Last year it was delivered by the Rt. Rev. W. C. Doane, Bishop of Albany.

The first annual event provided for in his will by Henry Shaw, the good man who founded this garden for the enlightenment and happiness of his fellow-men, was "The preaching of a sermon on the wisdom and goodness of God as shown in the growth of flowers, fruits, and other productions of the vegetable kingdom." A lovely poem in prose, for the perusal of which by his friends the writer's copy of the 1893 report is in constant use, is a sermon preached by the Rev. Cameron Mann from the text, "Consider the lilies of the field." This sermon, from a literary standpoint, is charming, and certainly helps to carry out the wise wish of the benevolent founder to inculcate in all a thankful spirit for the many lovely things in the vegetable kingdom which we find strewn with no niggard hand along our walk through life, making our own journey more beautiful and, it is hoped, our friends happier from contact with us.

J. F.

THE CRAMBIDÆ OF NORTH AMERICA ; by C. H. Fernald, A. M., Ph. D., Mass. Agr. College. Jan., 1896. Pp. 81, with six plates.

This latest work is characterized by the painstaking study which Prof. Fernald has taught us to expect in his publications. The statements are well considered ; the very words carefully chosen, so that there are few writers whom we may so entirely and unhesitatingly trust. Conscious as I am of my own shortcomings, that attention has been called to the "extreme desirability of verifying my statements when they involve a change in nomenclature or in synonymy," it is like an atonement for my thirty-five years of labour, without any merit of my own, that I reached so unimpeachable an observer as Prof. Fernald a friendly hand

at the beginning of his career among the little moths. And it is grateful to me, but quite out of the usual course, that Prof. Fernald should have remembered the circumstance. I thank him heartily. As I sat down to write this notice and was seeking for the proper words, a letter was brought in from a well-known and able German writer on the "*Tineides*," thanking me for sending him a copy of "Prof. Fernald's full and satisfactory work on the American Crambidae." It is certainly exactly this, and I need not seek further for adjectives. The appearance of being written quite easily, which Prof. Fernald's work bears, is deceptive. It has been all thought out and written over.

My own studies in the Crambids may give a little weight to a word of general praise and entitle me to offer some comments. The synoptic table and exact definitions will enable the student to identify his material even without the aid of the finely drawn and delicately coloured plates (the figure of *edonis* is perhaps too delicately coloured—I miss the "salmon pink"). But here and there we might easily have had, in addition, more comparative details, to enable one to seize readily important characters and bring the inter-relationships to light. The sequence of the descriptions of the species of *Crambus* is not that of the synoptic table, and it is not clear upon what principle it is laid down. In the absence of structural characters, we have the markings upon which to group the species. First there are the white species (*perlellus*, *girardellus*, etc.), reminding us of *Argyria*. Then the leather-brown species, with a white median stripe cut into blocks, *myellus*, *luctuellus*, *dissectus*. Then what may be considered the typical Crambids, species with gilded and fuscous primaries, with longitudinal subcostal satiny-white striping, *satrapellus*, *leachellus*, *carpenterellus*, *laqueatellus*, etc., etc.; again, with the stripes wanting, *vulgivagellus*, *behrensellus*, etc. These seem to pass, through forms like *attenuatus*, into the plain, gray, or fulvous species, with double, dark and bent transverse lines, such as *laciniellus*, *caliginosellus*, *luteolus*, *anceps*, *undatus*, etc. Then we have the blackish and white species like *labradoriensis* and *oregonicus*, while a number of peculiarly marked forms lead us, through *dimidiatellus*, to the species of *Thaumatopsis*. But this rough sketch of a possible arrangement is entirely suggestive. I may conclude with a few words upon three species. On Plate III., fig. 15, Prof. Fernald gives us a representation of *Crambus inornatellus*. But no mention is made of this pale yellowish form on page 43, where it is referred to merely in the synonymy of *perlellus*. It is nearly twenty

years since I went over the literature, but I believe Clemens describes *luteolellus* without the lines. If so, then *duplicatus* might be kept for the form with lines, of which *ula*, according to Prof. Fernald's figure, would be a sub-variety. It was with feelings of perplexity and annoyance that I found, on page 87 of the Philadelphia List, my *Crambus dimidiatellus* referred as a synonym of *T. pexellus*. The beautiful species is now rehabilitated, while I miss, what Prof. Fernald probably thinks is unnecessary, a word upon the circumstance. This is already the fifth name which has been restored to me, and for those who profess to consider such matters sentimental or unscientific, I should say that to me they are very important, and the distress inflicted by a careless or prejudiced reference is real. Schrank, in 1802, uses *Tinea* in the sense of *Crambus*; I miss an allusion to this in the "History," p. 4. Prof. Fernald has given us since 1884, in addition to catalogues and descriptive papers, four pamphlets on the Insects and Grasses, chiefly of Maine and the Eastern States. The fifth is this on the Crambids. I value all of them very highly. They are bound together and, as I turn over the leaves here in my study, separated by such miles of land and water from the one reality of my existence, I call to mind scenes and faces I may never behold again.

A. RADCLIFFE GROTE.

Roemer Museum, Hildesheim, Germany.

CLASSIFICATION OF THE GEOMETRINA OF NORTH AMERICA, with descriptions of new genera and species; by Rev. Geo. D. Hulst. Trans. American Entomological Soc., Vol. XXIII., pages 245 to 386, plates x. and xi. (1869).

The bulk of this paper consists of descriptions of 82 new genera and 143 new species, most of them from the West. That such an assemblage of new forms can be described in a single paper shows the imperfect state of our knowledge of the family.

The most valuable part of Dr. Hulst's work consists in the tabular synopsis of subfamilies and genera. The characters used seem contrasting and reasonably constant, so that these tables fill a long-felt want. In fact, the article forms the skeleton of a complete monograph, lacking only synoptic tables of species with descriptions of the old ones, bibliography and larval descriptions.

Dr. Hulst calls the group Geometrina, but in the opinion of the reviewer this term is not warranted. We may accept Dr. Hulst's two

families, Geometridæ and Ennomidæ, as consecutive groups of the Bombyces, discarding the superfamily term. However, as used by Dr. Hulst, this term may be only a convenient heading for the article.

The author is in some difficulty to separate the "Geometrina" from the other groups of Lepidoptera, and has to fall back on larval characters. He says: "The larva has one or more pairs of the anterior abdominal legs wanting, and they are thus distinguished from the Bombycina in the widest reach of that term." Yet this is not correct, since *Brephos*, included in the "Geometrina," has all the abdominal feet present, while *Nola*, excluded, entirely lacks the anterior pair.

In the classification Meyrick is followed, as Dr. Hulst considers his "in many respects by far the best yet proposed." Hübner's *Verzeichniss* receives recognition, but not the *Tentamen*. However, the *Tentamen* names are included in parentheses, so that any one differing in his opinion of the value of these names may easily apply them.

On the whole, Dr. Hulst's paper indicates a distinct advance in our knowledge of the Geometridæ.

HARRISON G. DYAR.

INSECT LIFE.—A short account of the classification and habits of insects; by F. V. Theobald, M. A., F. E. S. London: Methuen & Co. Pp. 235. (2s. 6d.)

Under the title of the "University Extension Series," the publishers are issuing a number of books on historical, literary, and scientific subjects, which are intended to be both popular and scholarly. We have not seen any of the other works of the series, and cannot, therefore, comment upon them, but the book before us seems hardly to come up to the expectations one would naturally form of a manual intended for use in preparation for "University Extension" lectures. The descriptive portion is meagre, and will afford a student a very vague idea of the insects belonging to the different orders. It is satisfactory, however, to find in an English publication some attention paid to economic entomology and the application of the insecticides which are in common use here. The book is neatly printed (though we have noticed several misprints in the spelling of names) and is illustrated with over fifty wood cuts.

C. J. S. B.

MR. WALTER W. FROGGATT has been appointed Entomologist to the Department of Agriculture, Sydney, New South Wales, Australia, in place of the late Mr. A. S. Olliff, F. E. S.

BRITISH BUTTERFLIES; by J. W. Tutt, F. E. S. London: George Allen and Sons, 1896. Pp. 469. (Price, 5s.)

It is only a few months since we spoke in terms of commendation of Mr. Tutt's Manual of the British Moths, and now we have before us even better work on the butterflies by the same industrious author. About one-fourth of the book is taken up with the general principles of collecting, representing a series of chapters on the four life-stages of butterflies, on variation and its causes, hibernation and aestivation, classification, and arranging and preserving specimens, and the habits of the butterflies. These are written in the author's pleasant, easy style, and as his previous works have made us familiar, and convey much information of interest to butterfly-hunters anywhere. We are glad that he insists very strongly upon the importance of labelling specimens with place and date of capture; though the English method of mounting and setting the specimens low down makes this a little inconvenient.

The descriptive portion of the work is complete and exhaustive, and more complete than that of any manual of British butterflies. It is filled with facts. In the case of each species there are given the scientific names, reference to the plate where the illustration is to be found, a bibliography, a concise description of the species, the "locality" in which are mentioned any known localities, as well as sexual distinctions, description of the pupa, and the time of appearance, habitat, and general habits. It will be seen that proper regard is paid to every detail of the insect, and that the author does not neglect the life history alone. The plates (uncoloured) are numerous and very admirable, and should enable any collector to identify his butterflies out of difficulty; there are also many illustrations in the text.

The arrangement of the book is very good, and the illustrations, especially the plates, are of the highest quality. The author's style is clear and concise, and the book is a most valuable addition to the literature of entomology. It is a book that every collector of British butterflies should have on his shelves, and it is a book that every student of entomology should read.

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ERRATUM.—Page 278, last line but one, for "no trace of the spots"
 read "no trace of *other* spots."



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THE CRINKLED FLANNEL MOTH, *MEGALOPYGE*
CRISPATA, PACKARD.

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No. 1.

THE CRINKLED FLANNEL MOTH (MEGALOPYGE CRISPATA, PACK.).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

September 3rd, 1895, I received several nearly full-grown specimens of the curious, sluglike caterpillars of this beautiful moth, so aptly named by Professor Comstock, "the crinkled flannel moth." The cunning brown caterpillars were placed in a cage here at the insectary, where they fed freely on apple leaves, although they were feeding on quince when found at Worcester, Mass. Since Dr. Packard described the insect in its different stages in 1864, its life-history has been worked out in detail by Dr. Lintner (Ent. Contrib., II., p. 138, 1870), and recently by Dr. Packard (Proc. Am. Phil. Soc. for 1894, p. 275). In this last paper Dr. Packard has described and figured in detail the extra two pairs of abdominal legs (seven pairs in all) possessed by the caterpillars, and some curious lateral glandular processes.

It is now our practice here at the insectary to photograph, so far as possible, every stage, phase, and habit of any insect that we may study. It is not often, however, that we have as good a subject as the crinkled flannel moth proved to be. The main object of this note is to introduce some of the lifelike pictures we were able to secure of this interesting and beautiful insect.

As shown at *a* on the plate, three of the cunning little caterpillars posed for their photograph, which represents their natural size and brings out their characteristic appearance much better than any other figures we have seen. They spun their tough brown cocoons (represented natural size at *a* on the plate), with the tightly fitting and ingenious door at one end, on September 5th. Upon prying open the door of one cocoon, the male pupa (shown natural size at *b* on the plate) was revealed. As the cage was kept in our warm office, the development of the insect was doubtless abnormally accelerated, for on December 21st and 24th the pupæ pushed open the little doors, worked their way nearly out of the cocoon, and the moths emerged. We aimed our "Premo" at one of the

male moths as it was resting quietly and naturally on the muslin cover of the cage, with the result as shown at *c* on the plate. We were somewhat loath to kill such a pretty, daintily bedecked creature, but — well, he now fills an honoured place in our collection here at the University. Figure *c* on the plate well represents this pretty creature (twice natural size) as he now looks in the collection. Imagine the lighter portions of the figure to be of a delicate straw-yellow colour and the darker waves and crinkles of a rich brown shade, and you have a faint conception of this crinkled flannel moth.

I do not know that the insect has ever done enough damage to make it of economic importance. It certainly has a wide range of food plants, as shown by Mr. Beutenmüller (*Ent. Americana*, III., 180), who lists twenty-five different plants, and the cranberry has since been added in Massachusetts. Briefly stated, its life-history seems to be as follows: The eggs are laid about July 1, and hatch in a week or ten days; the caterpillars feed during July and August, pupating in September; some of the moths may emerge in the fall, but doubtless most of them hibernate as pupæ, the moths appearing in June and some laying their eggs.

TORONTO BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

It is with much gratification that we announce the formation of a branch of our Society in Toronto. In the month of February last a number of entomologists in Toronto, feeling their isolation and need of co-operation, met together and decided to form an organization for the promotion of the study of entomology. They accordingly established "The Toronto Entomological Society," with Mr. E. V. Rippon as President, and Mr. Arthur Gibson, Secretary. Regular meetings have been held on the first and third Fridays of each month, and recently a room has been engaged at 451 Parliament Street, where the books and collections are kept and the meetings held, and which is open at all times for the use of the members. For the last ten months the Society has been very successful and its members full of enthusiasm; much satisfactory work has been accomplished, and great pleasure has been derived by the members from meeting with kindred spirits, comparing specimens, discussing questions that arise from time to time, and giving and receiving much assistance in many ways.

Recently the desirability of affiliating with the old established Entomological Society of Ontario was brought before the members, and after

full deliberation it was decided to become incorporated with it as a "Branch," in accordance with the terms of our Constitution. It will therefore be known, from the beginning of the New Year, as "The Toronto Branch of the Entomological Society of Ontario." It is hoped that every one interested in entomology, living in Toronto or the neighbourhood, will join the "Branch," and thus become members of our Society. The next meeting will be held on Friday evening, January 8th, at 8 o'clock, when visitors will be heartily welcomed.

The Montreal Branch has been in active operation for over twenty-three years, and held its 200th meeting a few months ago. We hope that in time to come the Toronto Branch may be able to boast of a similar record, and that each year as it goes by may find it growing and prospering, and doing good work for the furtherance of the science of entomology in the Dominion of Canada.

BREPPOS MIDDENDORFI, MEN.

On April 25th, 1896, I made a very lucky capture of a perfect specimen of this rare and beautiful moth. The afternoon being sunshiny and warm—one of our first spring days—I had gone out to look for beetles in a piece of wood along the Red River, a few miles from the city. This locality had proved rich in *Carabidæ* in 1894, about the same date. Greatly to my disgust, I found the place transformed, all logs and "brush" having been cleared away the previous season, and hardly a beetle of any kind was to be found.

The moth in question was first seen to alight on the bank of a cutting leading down to the river; when disturbed from there by my investigations as to its identity, it flew up and down the roadway for a little while, and then hovered about some patches of mud, occasionally resting on the mud in the sunshine, very much after the manner of some of our butterflies. By this time I had got near enough to it to discover that it was something quite new to me, and my desire to capture it was therefore increased ten-fold. I had no net with me; in fact, I was only provided with a rather narrow-necked cyanide bottle for *Coleoptera* (the neck of my bottle was not an inch in diameter). That I was able, after several futile attempts, to get the mouth of the bottle down over it as it sat in the road, without damaging it in any way, was a matter of surprise at the time and congratulation whenever I have thought of it since. I certainly never made a more lucky capture. To Prof. John B. Smith I am indebted both for the identification and for his generosity in returning the specimen to me.

A. W. HANHAM, Winnipeg, Man.

ON THE MEXICAN BEES OF THE GENUS AUGOCHLORA.

BY T. D. A. COCKERELL, MESILLA, N. M.

The Mexican species of this beautiful genus may be readily separated by the following table :—

- A. Hind spur of hind tibia minutely ciliate or simple. = AUGOCHLORA, s. str.
1. Entirely copper colour, with tints of carmine *flammea*, Sm.
 2. Head and thorax dark indigo blue, abdomen black with some green reflections *nigrocyanæa*, Ckll.
 3. Head and thorax green 4.
 4. Abdomen black, size small *seminigra*, Ckll.
Abdomen crimson *ignita*, Sm.
Abdomen green, without hair-bands 5.
 5. Hind margins of abdominal segments broadly black; large blue-green species, with fuscous nervures *Binghami*, n. sp. ♂.
Hind margins of abdominal segments narrowly or not black; smaller, more yellowish-green species 6.
 6. Small, wings dusky, nervures fuscous *aurifera*, n. sp.
Medium size, nervures dull testaceous 7.
 7. Face broad, emargination of eyes deep *labrosa*, Say.
Face narrow, emargination of eyes shallow *pura*, Say.
- B. Hind spur of hind tibia pectinate. = AUGOCHLOROPSIS,
- subg. nov. (type, *subignita*).
1. Head and thorax black, abdomen ferruginous *aspasia*, Sm.
Head and thorax green 2.
 2. Abdomen crimson *subignita*, Ckll.
Abdomen brassy, with dense short fulvous pubescence beyond basal segment *aurora*, Sm.
Abdomen green, of the same colour as head and thorax, with two narrow bands of yellow pubescence *splendida*, Sm.
- C. Hind spur of hind tibia not yet described.
1. Bright green, agreeing only with *splendida* in having abdominal hair-bands, but these are white *viridana*, Sm.
 2. Small piceous species; margin of mesothorax, postscutellum, most of enclosure of metathorax, and bases of second and third abdominal segments shining green *tisiphone*, Gribodo.

A. labrosa is cited from Mexico by its describer, but I have not seen it from that country. Mr. Robertson sends it to me from Illinois. There are two species found in Texas, which may be expected also across the

Mexican border. One of them is what passes for *A. sumptuosa*, Sm., in this country, and indeed agrees with Smith's description; but Col. Bingham finds that a co-type in the British Museum belongs to Section A above (spur minutely ciliate), while our insect belongs to Sect. B. It is just possible that the B. M. co-type is not identical with the true type of *sumptuosa*; if this is not so, our *sumptuosa* will have to be renamed. The other Texan species referred to was recorded by Cresson as *A. lucidula*, Sm., but it differs from that, and is referable to *A. humeralis*, Patton, of which it may perhaps constitute a geographical race. I have several specimens collected by Prof. C. H. T. Townsend at Beeville, Texas, Aug. 29, 1896, on a species of Compositæ. Col. Bingham's studies at the British Museum show that *A. humeralis*, which belongs to Sect. B, cannot be identical with *A. fervida*, Sm., as Robertson has supposed, since that belongs to Sect. A. Also, Patton was wrong in referring *lucidula*, Sm., which belongs to Sect. B, to *viridula*, Sm., which is of Sect. A. I will now describe the two new species indicated above:—

Augochlora Binghami, n. sp. (subg. *Augochlora*, s. str.)—♂. Length about 12 mm., brilliant bluish-green, the face a yellower green. Face narrowing below, eyes deeply emarginate; sides of face with conspicuous, partly appressed, silky white pubescence; cheeks with long white hairs. Clypeus, supraclypeal area and middle of vertex with sparse, inconspicuous black hairs. Clypeus rather prominent, subcancellate with very large close punctures, its anterior margin and the upper half of the labrum whitish, mandibles wholly dark. Vertex finely and very closely punctured. Antennæ reaching to base of wings, piceous, flagellum obscurely rufescent beneath, last joint conspicuously hooked. Mesothorax shining, with very distinct rather small close punctures, much densest at the sides, where a minute cancellation results. Parapsidal grooves distinct. Prothoracic keel fairly strong. Enclosure of metathorax fairly well defined, irregularly wrinkled, its hind margin gently curved, not angled. Posterior truncation roughened, bounded below at sides by an acute ridge, which ascending rapidly falls. Pubescence of thorax sparse, grayish-white, black and inconspicuous on dorsum. Tegulæ shining piceous, anteriorly whitish, basally green and punctured. Wings smoky-hyaline, apical margin darker, stigma dull testaceous, nervures fuscous, marginal cell minutely appendiculate. Legs green with black tarsi, pubescence short and pale. Abdomen shining, closely punctured, hind margins of segments broadly

purplish-black. No hair-bands, but a very fine glittering pile all over, longer pale hairs at base of first segment, sparse black hairs on dorsum of hindmost segments and at tip. Punctuation of second segment conspicuously closer than that of first. Venter piceous, first three segments with blue reflections. End of third segment with a large dark brown brush of hair, shaped like the tail of a fish; *i. e.* deeply emarginate, the sides diverging and ending in a point.

Hab.—San Rafael, Vera Cruz, March 13, on flowers of plant No. 4, which is papilionaceous (C. H. T. Townsend).

This beautiful species is named after Lt.-Col. Bingham, without whose notes on the British Museum types I should not have attempted this paper.

Augochlora aurifera, n. sp. (subg. *Augochlora*, s. str.)—♀. Length about $7\frac{1}{2}$ mm, green; head and thorax dullish, rather a bluish-green; abdomen shining, a yellower green, with the hind margins of the segments very narrowly coppery. Face fairly broad, emargination of eyes deep. Pubescence of head and thorax sparse and inconspicuous, dirty whitish, some black hairs on thoracic dorsum; lower part of face in certain lights canescent. Clypeus with close punctures of unequal size, supraclypeal area more finely punctured, vertex coarsely granular. Labrum and margin of clypeus black. Mandibles notched within, stout, rufescent medially. Glossa very long and narrow, coming to a fine point. Antennæ black, flagellum slightly rufescent beneath. Mesothorax very closely, finely, and uniformly punctured. Enclosure of metathorax conspicuously longitudinally, or rather radiately, sulcate. Truncation shining, finely malleate, with a median groove. Tegulæ shining piceous, the margin subhyaline. Wings smoky, stigma dull testaceous, nervures fuscous, marginal cell appendiculate. Legs piceous-black, with brownish pubescence; only the anterior femora show any green. Abdomen shining, with minute, not very close, punctures; pubescence very sparse, no hair-bands. It requires a strong lens to see the abdominal punctures.

Hab.—San Rafael, Vera Cruz, March 9, on flowers of plant No. 6, referred by Dr. Rose to the genus *Melopodium*. The hind legs, base of thorax and abdomen, and ventral surface of abdomen, carry considerable quantities of the orange pollen. Another specimen differs by being much bluer, the punctuation a little coarser, the stigma fuscous; but it is evidently the same species. It is from San Rafael, March 14, on flowers of plant No. 5, a *Vernonia*. Both were collected by Prof. C. H. T. Townsend.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XIX. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC — (*Continued*).
TRIBE IX. — GALERUCINI.

This tribes includes a number of species which are, as a rule, easily distinguished by the peculiar appearance given by their soft integuments and usually somewhat elongate form. A number of them are pubescent, while others, on account of the peculiar sculpture of the surface, are quite opaque, the effect on the eye being, at first glance, the same in each case. The elytra in our species are longer than the abdomen, the prothorax is margined, the antennæ approximate, inserted on the front, the hind legs with rather slender thighs, not fitted for leaping. It will be remembered in this connection that I consider the Halticini as a distinct tribe.

Many of the Galerucini are extremely injurious, the striped cucumber beetle being well known and dreaded by gardeners; its congener, *Diabrotica longicornis*, which has lately been found by Mr. Harrington in the Eastern Provinces, is a notorious pest to corn in the United States. In the Northeastern States the imported elm-leaf beetle, *Galerucella xanthomelana*, Schr., is doing much mischief, but I cannot find that it is reported from Canada. If found, it may be distinguished from all our other species of *Galerucella* by the colour of the antennæ, which are piceous above and pale beneath, while the elytra are comparatively finely and equally punctate. It is yellowish above, the head with one dark spot, the thorax with three, the elytra with a short inner stripe (sometimes wanting), and a long one from the humerus; legs pale, each femur with a small dark spot.

The tribe has recently been worked up in an excellent paper by Dr. Horn, and this has been closely followed and freely used in the preparation of the following pages. In order to avoid the constant repetition of quotation marks and statements of acknowledgments, it is well to say that the differential characters brought out are in almost every case those used by the Doctor, and that while I have not scrupled to change the arrangement of his tables where it seemed to me more likely to serve the purpose of the present article, I have, on the other hand, found it impossible to improve on most of his expressions, and have therefore used them entire. With this acknowledgment of the source of whatever is good in the paper, we may proceed to separate the genera occurring in Canada, thus:—

- A. Anterior coxal cavities open behind.
- b. Claws simple or bifid.
- c. Tibiæ without terminal spurs; epipleura of elytra extending nearly to apices.
- d. Antennæ longer than one half the body; claws deeply bifid.
Third antennal joint shorter than fourth; large
species *Trirhabda*.
Third joint longer than fourth; small
species *Galerucella*.
- dd. Antennæ less than half as long as body; claws simple or
narrowly bifid *Monoxia*.
- cc. Tibiæ (middle and posterior) with terminal spurs, outer edge
more or less carinate *Diabrotica*.
- bb. Claws appendiculate (*i. e.* with broad dilatation at base).
Epipleura not distinct, tibiæ without spurs *Phyllobrotica*.
Epipleura distinct, all the tibiæ with spurs *Luperodes*.
- AA. Anterior coxal cavities closed behind.
Large species, tarsal claws bifid, tibiæ without spurs... *Galeruca*.
Smaller species, claws appendiculate, tibiæ with spurs... *Cerotoma*.

I have omitted *Scelolyperus* from the above table, although the Southern Californian *S. maculicollis*, Lec., is in the Society list. The genus belongs in the group with open anterior coxal cavities, appendiculate claws and well-defined epipleura. In the scheme it would precede *Luperodes*, from which it differs in having no tibial spurs. The species above mentioned is about one-fourth of an inch in length, head and under surface black, thorax either yellow with three dark spots or entirely black, elytra bluish or greenish. Antennæ two-thirds as long as the body, piceous, with three basal joints pale beneath.

TRIRHABDA, Lec.

Large insects, of rather elongate-oblong form, usually of somewhat opaque surface, the thorax in most cases spotted, the elytra bluish, greenish, or brownish, with yellowish stripes. They are to be taken during the summer months by sweeping rank herbage in lanes and meadows, and may often be taken in numbers on the golden-rod. Dr. Horn has thus separated our species:

- A. Surface of body without any trace of metallic lustre in the markings, these being opaque or brownish.

- b. Elytral punctures so dense as to be indistinct as such.
 Yellow vittæ of elytra attenuate to apex. .30-.40
 in.....*tomentosa*, Linn.
 Yellow vittæ broad, parallel and entire. .28-.38
 in.....*canadensis*, Kby.
- bb. Elytral punctures dense, but distinctly separate. Elytra normally vittate as in *canadensis*. .26-.36 in.....*virgata*, Lec.
- AA. Surface of body with metallic lustre; if not in the markings of the elytra, at least on those of the head and thorax. Punctuation of elytra comparatively rough.
 Elytra entirely blue, except border. .20-.32
 in.....*flavolimbata*, Mann.
 Elytra with outer border and discal vitta yellow.
 .20-.28 in.....*convergens*, Lec.

GALERUCELLA, Crotch.

This genus, as now understood, contains species formerly distributed partially in *Adimonia* and partially in *Galeruca*. Many of them are quite common, and are to be found in the sweepings of meadows, on water lilies, *Sagittaria*, *Eupatorium*, or occasionally on the leaves of deciduous trees, as in the case of *G. cavicollis*, which I have taken abundantly on wild cherry. All but three of the North American species have been recorded from Canada, and Dr. Horn's table is here reproduced almost in full, though some portions are transposed, and the remainder made to include the non-vittate specimens of *G. americana*, so as to render identification a trifle more easy when reference cannot be had to detailed descriptions. The limit of variation in some of the vittate forms is very wide, and has resulted in the multiplication of nominal species. It is believed that the table will now cover any cases likely to be met with in the Provinces of Ontario and Quebec. In case of the occurrence there of the elm-leaf beetle, a reference to the first page of this article will result in its proper identification.

A. Colour red.

- Elytra more coarsely punctured, intervals between punctures distinct, surface shining. .18-.22 in.....*cavicollis*, Lec.
 Elytra finely and densely punctured, surface rather opaque.
 .18-.22 in.....*rufosanguinea*, Say.
- AA. Colour yellowish, brownish or piceous, elytra vittate or not.
- b. Elytra normally vittate.

- c. Elytra scarcely explanate at sides, middle coxæ separated.
 Elytra convex, coarsely punctate; thorax more or less shining, spotted indistinctly if at all. .14-.26
 in *americana*, Fabr.
 Elytra less convex, more closely and less coarsely punctate, thorax opaque with three spots. .20-.24
 in *sexvittata*, Lec.
- cc. Elytra distinctly explanate, middle coxæ contiguous.
 Sutural vitta joined by next at or behind the middle. .14-.20 in *notulata*, Fabr.
 Vitta next to the sutural very short, basal. .14-.20
 in *notata*, Fabr.
- bb. Elytra not vittate, often with lighter side margin.
- d. Form convex, elytra coarsely punctate... . *americana*, var.
- dd. Form not notably convex.
- e. Middle coxæ separated, thorax angulate at middle, subsinuate behind, hind angles obtuse. .18-.24
 in... *nymphææ*, Linn.
- ee. Middle coxæ contiguous, hind angles of thorax distinct.
 Thorax coarsely, not very closely, punctate. *notulata*, var.
 Thorax densely punctured and opaque. .18-.22
 in *decora*, Say.

MONOXIA, Lec.

M. consputa, Lec. (*guttulata*), has been recorded on the Society's list. It is a small insect, .14-.18 in. long, of a somewhat oblong form, resembling some *Galerucella*, but with shorter antennæ; yellowish or reddish-yellow in colour, elytra often with numerous very small black spots. It is common on the plains to the westward, but I have seen no specimens from Ontario or Quebec, and it is just possible that an immaculate specimen of *Galerucella notulata* has been mistaken for it.

DIABROTICA, Chev.

Here belongs the striped cucumber beetle (*D. vittata*, Fabr., Fig. 1), so common on and often injurious to cucumber and squash vines. It is a little less than one-fourth of an inch in length, yellow above; head, scutellum, and three elytral stripes (one common sutural, one discal on each wing-cover) black. Basal joints of antennæ partially yellowish, legs with dark tarsi and knees, front tibiæ and tips of middle and hind tibiæ also



FIG. 1.

dark. The twelve-spotted *Diabrotica*, *D. 12-punctata*, Fabr. (Fig. 2), in life is pale greenish above, turning to yellowish in old cabinet specimens; antennæ dark, with three basal joints pale, head black, scutellum dark, each elytron with six black spots. Legs dark, basal half of femora pale. Size a little greater than the preceding. Mr. Harrington has recently found *D. longicornis*, Say, in the Eastern Provinces. It may easily be distinguished by its smaller size and immaculate green, fading to yellowish, elytra.



FIG. 2.

PHYLLOBROTICA, Chevz.

These are very pretty insects, marked with yellow and black. Two have been recorded from Canada, but as there is a chance of error in determination I herewith include *limbata* as well, since its other recorded distribution seems to indicate a more northern range than is found in *discoidea*. All three have yellow head and thorax. Dr. Horn thus defines them:

Elytra yellow, with two oval piceous spots on each (Fig. 3), .22-.28 in..... *decorata*, Say.

Elytra piceous, sides and suture yellow.

Thorax with moderately deep fovea each side. .14-.26

in..... *discoidea*, Fabr.

Thorax with transverse depression. .14-.26 in..... *limbata*, Fabr.

LUPERODES, Motsch.

Contains one Canadian species, *L. meraca*, Say, an elongate insect, .20 in. long, dark blue or blue-black above, piceous beneath, thorax nearly equal in length and breadth, hind angles acute and prominent, disk convex, smooth, elytra sparsely punctate. Legs yellow, basal half of femora piceous. It has been reported by Mr. Chittenden as feeding on the witch-hazel, while on another occasion he found it in great numbers on the flowers of the wild rose, the petals of which served as food.



FIG. 3.

GALERUCA, Geoff.

G. externa, Say, represents the genus in North America, and while commoner to the eastward, has been reported from Canada. It is a robust insect, easily known from our other Galerucini by the large size (27-.44 in.) and broadly oval form. The colour is blackish, outer margin

of elytra yellowish, upper surface coarsely and closely punctate. Elytra with four more or less well-marked costæ. The food-plant of this beetle is still unknown to me, for, while I have collected a great many specimens, they were always found under logs or stones.

CEROTOMA, Chevr.

Represented by *C. trifurcata*, Forst. (*caminea*, Fabr.), resembling somewhat the common *Diabrotica 12-punctata* in form, but shorter. Head and under side of body black, upper surface of thorax and elytra yellowish or occasionally red. Elytra marked with black, as shown in fig. 4, this pattern being often reduced or added to by the greater or less extension of the yellow. Length, .14-.20 inch. Mr. Chittenden records the bush-clover, *Lespedeza*, as a food plant, and remarks that legumes form the chief food of the species. My own captures have been, for the most part, made by overturning boards and chips in patches of meadow land during the middle of spring.



FIG. 4.

A GENERIC REVISION OF THE HYPOGYMNIDÆ (LIPARIDÆ).

BY HARRISON G. DYAR, NEW YORK.

Before the generic names of our moths can become permanent, it is necessary that all the described genera should be compared, but specially the older genera of Europe. To make a beginning in this matter, I have drawn up the following synoptic table of the Hypogymnidæ, based on the characters used in Hampson's Moths of India, adding thereto the species found in Europe and in North America. The types of the genera are recognized as determined by Kirby.

Probably but few, if any, changes will be necessary from this list, as the African and South American species for the most part belong to other genera, or else have later dates than the generic names here defined.

I exclude two genera given by Hampson, viz.: Retarda and Thiacidæ. The latter seems to me to be a Noctuid, perhaps one of the Apatelidæ, while the former has the venation of the Tineides and is without frenulum; it probably represents a new family type.

In the Tentamen, Hübner gives the three plural terms, Hypogymnæ, Leucomæ, and Dasychiræ, all referring to this family. As these appear to be the first plural terms, one of them must stand for the family. The

term Liparidæ as used by Herrich-Schaffer, Kirby, etc., and the Lymantriidæ of Hampson cannot stand. Grote at first used Dasychiræ, as in his list of 1882. Later he selected Leucomidæ (Syst. Lep. Hild., 1895), and finally Hypogymnidæ (Syst. der Nord. Schmett., 1896). Dasychiridæ is unavailable as the generic term becomes synonymous, and the first of Hübner's terms may best be retained.

Two new generic terms seem necessary. The two European species of *Ocnéria* are not congeneric, as one has two pairs of spurs on the hind tibiæ and the other but one. The latter may be separated under the term *Parocnéria*, type *detrita*, Esp. The same is the case with our species of *Notolophus*. All the European species which I have seen, and our *antiqua* and *vetusta*, have one pair of spurs, as stated by Hampson. The larvæ have black heads. Two other species, *leucostigma* and *definita*, have two pairs of spurs, and may be called *Hemerocampa*. The larvæ have pale heads.

I add to the synopsis a partial list of species. Kirby and Hampson may be consulted for details, and for the genera not specifically mentioned.

1. Primaries with vein 10 from the accessory cell..... 2.
 Primaries with vein 10 from beyond the accessory cell.... *Mardara*.
 Primaries without accessory cell, or rarely with one with vein 10
 before the accessory cell or joined to vein 11..... 12.
2. Palpi porrect..... 3.
 Palpi upturned..... 11.
3. Hind tibiæ with no spurs..... *Varmina*.
 Hind tibiæ with one pair of spurs..... 4.
 Hind tibiæ with two pairs of spurs..... 6.
4. Female with well-developed wings..... 5.
 Female with the wings useless, largely aborted.... *Hypogymna* (2).
 Female with aborted wings..... *Notolophus* (3).
5. Robust, the palpi not or but slightly exceeding the
 front..... *Gynaephora* (1).
 Fragile with small body, the palpi considerably exceeding
 the front..... *Pantana*.
6. Primaries short and broad..... 7.
 Primaries more produced..... 9.
7. Female with well developed wings..... 8.
 Female with aborted wings.... *Hemerocampa* (7).

-
8. Fore tarsi with lateral tufts of hair on the joints..... *Cifuna*.
 Fore tarsi without these tufts..... *Aroa*.
9. Fore tarsi smooth haired ; palpi long..... *Laelia* (4).
 Fore tarsi more roughly haired or tufted..... 10.
10. Palpi not reaching beyond the front..... *Orgyia* (5).
 Palpi reaching beyond the front..... *Olene* (6).
11. Palpi slight, closely approximated to the front and not
 reaching the vertex..... *Daplasa*.
 Palpi reaching the vertex..... *Numenes*.
 Palpi reaching above the vertex..... *Pida*.
12. Primaries with veins 7 to 10 stalked..... 13.
 Primaries with veins 8 to 10 stalked..... 23.
 Primaries with vein 10 from the cell, or rarely stalked with 11.... 24.
13. Palpi upturned..... 14.
 Palpi porrect..... 17.
14. Primaries with the apex rounded..... 15.
 Primaries with the apex acute..... *Topomesa*.
15. Primaries with vein 10 given off near the apex..... *Heracula*.
 Primaries with vein 10 given off nearer the cell than vein 7..... 16.
16. Female with well developed wings..... *Lymantria* (8).
 Female with aborted wings..... *Enome* (9).
17. Posterior tibiæ with two pairs of spurs..... 18.
 Posterior tibiæ with one pair of spurs..... 21.
18. Palpi short..... 19.
 Palpi long..... 22.
19. Vein 5 of secondaries absent..... *Leucoma* (12).
 Vein 5 of secondaries present..... 20.
20. Primaries with vein 10 given off near the apex..... *Euproctis* (13).
 Primaries with vein 10 nearer the cell, or with vein 7..... *Cispia*.
21. Palpi very minute..... *Perina*.
 Palpi rather long..... *Parocneria* (10).
22. Antennæ of female with long pectinations..... *Imaus*.
 Antennæ of the female with short pectinations..... *Ocineria* (11).
23. Vein 5 of secondaries near lower angle of cell : palpi
 very long..... *Dactyorkyncha*.
 Vein 5 near upper angle of cell : veins 3 and 4 united.... *Gaeziina*.
24. Palpi porrect..... 25.
 Palpi upturned..... *Arctornis* (14).

25. Palpi long; hind tibiae with two pairs of spurs.....*Himala*.
 Palpi short; hind tibiae with one pair of spurs.....26.
 26. Secondaries with veinlets between vein 1 and margin..*Dendrophelps*.
 Secondaries without supplementary veinlets.....*Stilpnolia* (15).

1. Genus GYNÆPHORA, Hübner.

Type *selenitica*, Esp. Also, *ladacensis*, Moore (Hampson L., 435, as *Lachana*); *rossii*, Curt., and probably *groenlandica*, Hom., which I have not seen.

2. Genus HYPOGYMNA, Hübner.

Type *morio*, Linn.

3. Genus NOTOLOPHUS, Germ.

Type *antiqua*, Linn. Also, *gonostigma*, Linn.; *ericia*, Germ.; *postica*, Walk.; *viridescens*, Walk.; *turbata*, Butl.; *vetusta*, Boisd.; *cana*, Hy. Edw.; *gulosa*, Hy. Edw.

4. Genus LAELIA, Stephens.

Type *coenosa*, Hübn. Also 12 Indian species.

5. Genus ORGYIA, Ochs. (= *Dasychira*, Hübn.)

Type *fascellina*, L. Also *pudibunda*, L.

6. Genus OLENE, Hübn. (= *Dasychira*, Hampson = *Parorgyia*, Packard).

Type *mendosa*, Hübn. Also *abietis*, Den. & Sch.; *cinnamomea*, G. R.; *achatina*, A. S.; *leucophæa*, A. S.; *plagiata*, Walk.; and 18 Indian species.

7. Genus HEMEROCAMPA, Dyar.

Type *leucostigma*, A. S. Also *definita*, Pack.

8. Genus LYMANTRIA, Hübn.

Type *monacha*, L. Also *dispar*, L., and 14 species from India.

9. Genus ENOME, Walk.

Type *ampla*, Walk. Also ten other Indian species. Hampson makes this a section of *Lymantria*, but I regard it as a higher group.

10. Genus PAROCNERIA, Dyar.

Type *detrita*, Esp.

11. Genus OCNERIA, Hübn.

Type *rubea*, Fab.

12. Genus LEUCOMA, Hübn., Tent. (= *Porthesia*, Steph.)

Type *similis*, Fuessl. Also two Indian species.

13. Genus EUPROCTIS, Hübn. (= *Artaxa*, Wlk.)
Type *chrysorrhæa*, L. Also fifty-three Indian species. See Hampson for the generic synonymy.
14. Genus ARCTORNIS, Germ. (= || *Leucoma*, Steph. = || *Laria*, Schr.)
Type *L-nigrum*, Müll. Also eight Indian species.
15. Genus STILPNOTIA, Westw. & Hump. (= *Leucosia*, Ramb. = *Charala*, Moore = *Caragola* Moore = *Nymphyxis*, Grote.)
Type *salicis*, Linn. Also six Indian species listed under *Caviria*, Walk., which, however, is a South American genus, and not strictly congeneric with the Indian forms.

CATALOGUE OF THE PHYTOPHAGOUS AND PARASITIC HYMENOPTERA OF VANCOUVER ISLAND.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The following list is based upon a very interesting collection made, chiefly at Cedar Hill, near Victoria, by the Rev. G. W. Taylor, F.R.S.C., but includes such other species as I have found described, or recorded from Vancouver Island. Even with such additions it is a short list in comparison with those that could be compiled from much less extensive areas in Ontario. British Columbia has, as yet, had but few resident entomologists, and its rich fauna is, in consequence, but poorly known. Butterflies and beetles have been fairly well collected, but in other directions there are almost unexplored fields for investigation.

I have found but little literature relating to the Hymenoptera of Vancouver Island, and but scanty records of species captured there. Lord, in his interesting narrative of a Naturalist in British Columbia, has an appendix enumerating the insects secured by him, with descriptions of a few new species. Cresson, in a paper entitled Descriptions of Ichneumonidæ, chiefly from the Pacific Slope of the United States and British North America (Proc. Acad. Nat. Sci., Phil.; Nov., 1878), described about twenty-five species from the Island, contained in the collections of the late distinguished entomologists, Mr. H. Edwards and Mr. Crotch. The late Abbé Provancher described a few species in the CANADIAN ENTOMOLOGIST (Vol. XVII., p. 114), and in the Additions to his Petite Faune Entomologique du Canada credits the Island with some thirty-five species, mostly new forms contributed by Mr. Taylor and Mr. Fletcher. The types of some of those species are now in my collection, through Mr. Fletcher's kindness, and have been found very useful for comparison.

Kirby, in his List of the Hymenoptera in the British Museum, records several species of Tenthredinidæ and Uroceridæ. To Mr. Taylor, however, is due a large proportion of our knowledge of the Hymenopterous fauna. In Vol. XVI. and XVII. he published a list of eighty-one species, from the vicinity of Victoria, and he continued to collect there and sent specimens to Mr. Fletcher and myself until he came to reside in Ottawa a few years ago. He then brought his collection with him to this city, and on his return to the Pacific Coast he placed all the remaining Hymenoptera in my hands, on the condition that I should prepare a list of them for publication, in revision and enlargement of his own earlier list, in which there are some errors in determination.

The collection has proved to be a most interesting one, and to contain quite a number of new insects. It is, as might be expected, deficient in the smaller forms, such as Cynipidæ, Braconidæ, Chalcididæ, and Proctotrypidæ. As time has permitted, I have proceeded with the determination of these insects, and have published descriptions (CAN. ENT., Vol. XXVI.) of some new species. The Aculeata require further study, especially such genera as *Andrena*, *Halictus*, *Osmia*, etc., before a satisfactory list can be made of them. Mr. Taylor is now resident at Nanaimo, and it is to be hoped that his duties will afford him opportunity to collect in that district. The publication of a list (even though imperfect) of the recorded species may perhaps stimulate others to join with him in a more systematic collection of the Hymenoptera of Vancouver Island, which offers so rich a field for study. The fauna is evidently a very extensive one, containing many species occurring in the Pacific States, while in the northern portion of the Island and on the mountains there should be a large intermingling of species inhabiting Alaska and the Rocky Mountains. It would not require much effort to increase many-fold the number of species at present known. The order Hymenoptera is so rich in species, and the conditions of the occurrence of the species are so varied, that it will long be possible to discover forms new to science, even in Ontario, where the fauna is so much better known. In the vast and diversified regions of the Pacific Slope, such new and undescribed species must be almost unlimited.

TENTHREDINIDÆ.

Trichiosoma Taylori, *Prov.*—Common on the Island and throughout B.

C. I took it at New Westminster, and have examples from Tacoma (Wickham) and the Rocky Mountains (Bean). Probably only a

Western form of *T. triangulum*, under which name Taylor records it. Cocoons very frequently parasitized.

Trichiosoma vittellina, Linn.—Kirby (*List Hym. Brit. Musm., Vol. I., p. 10*) records a ♂ of this European species from the Island (Dr. Lyall) and a ♀ from the Rocky Mountains. Perhaps all our forms belong to one boreal species. They certainly do not vary so much as the insects included in *Cimbex americana*.

Abia Kennicotti, Nort.—One ♀ received by Mr. Fletcher, dated 4th June.

Hylotoma McLeayi, Leach.—One ♀ received by Mr. Fletcher, dated 2nd June.

Euura sp.—Two specimens in condition not favorable for determination.

Cladius pectinicornis, Fourc; *Cladius isomera*, Harris.—One ♀ from Mr. Wickham.

Pontania nevadensis, Cress. (*Nematus*).—Marlatt; Rev. N. A. Nematinae, p. 30.

Pteronus mendicus, Walsh (*Nematus*).—Two ♀ received by Mr. Fletcher; also one ♀ from Mr. Wickham.

Pteronus vancouverensis, Marlatt.—Rev. N. A. Nematinae, p. 70.

Pachynematus coloradensis, Marlatt.—One ♀ received by Mr. Fletcher.

Pachynematus palliventris, Cress. (*Nematus*).—One ♀ received by Mr. Fletcher apparently belongs to this species.

Dolerus collaris, Say.—One ♀.

Dolerus sericeus, Say.—Eight ♀, seven ♂; a very common species, generally more robust and pubescent than Ottawa examples.

Monophadnus atratus, Hargtn.—Type ♂ in my coll.

Phymatocera nigra, Hargtn.—One ♂. April.

Hoplocampa halcyon, Nort.—Taylor; CAN. ENT., Vol. XVI., p. 92.

Labidia opimus, Cress.

Allantus opimus, Cr.; *Labidia columbiana*, Prov.—Originally described from V. I. collection of Crotch; redescribed from Taylor's collection. Appears to be common. Four ♀, four ♂: The *A. originalis* of Taylor's list, and probably identical with that species.

Allantus elegantulus, Cress.—Five ♀, one ♂; June. Also to Fletcher, four ♀, two ♂; labelled May and June.

Taxonus parens, Prov.—Type ♂ in my coll. Probably the ♂ of *Strongylogaster rubripes*, Cress., from Col.

Strongylogaster distans, *Nort.*—Common in April and May. I have eight ♀ and six ♂ specimens, and Mr. Fletcher has six ♀s. The abdomen of the male is entirely red, except base of first segment and basal plates, but the female has the remaining segments more or less marked with basal black spots.

Strongylogaster (?) *marginata*, *Prov.*

Selandria marginata, *Prov.*—Type ♀ in my coll. Mr. Fletcher has also six ♀ and four ♂ from Cedar Hill. May and June.

Tenthredo erythromera, *Prov.*—Type ♀ in my coll.

Tenthredo nigrisoma, *Hargtn.*—Types ♀ in my coll. One taken by Taylor, 5th June, 1888; the other, also at Victoria, by Wickham.

Tenthredo nigricosta, *Prov.*—Type ♀ in my coll.

Tenthredo rubricus, *Prov.*

Allantus rubricus, *Prov.*—Type ♀ and another in my coll.; one also examined for Mr. Fletcher. The antennæ are not those of an *Allantus*, and the insect is apparently a variety of *T. mellina*, with antennæ slightly shorter and pale markings less conspicuous.

Tenthredo ruficoxa, *Prov.*—Type ♀ in my coll.

Tenthredo rufopedibus, *Nort.*—Recorded by Taylor as common in spring, but not in his collection; probably the species I have determined as *T. variata*.

Tenthredo terminalis, *Prov.*—Type ♀ in my coll.

Tenthredo variata, *Nort.*—Three ♂ specimens. May and June. Mr. Fletcher has also one ♂.

Tenthredo varipicta, *Cress.*—*Prov.*; *Add. Faune Hym.*, p. 14. Two females taken 28th May and 4th June, received by Mr. Fletcher.

Tenthredopsis Evansii, *Hargtn.*—Mr. Fletcher has one ♂ taken in May.

Synairema pacifica, *Prov.*—Type ♀ in my coll. Apparently a species of *Macrophya*; the coxæ are shorter than usual, but the femora reach to tip of abdomen. Head coarsely punctured; in shape and sculpture resembling *Macrophya*; antennæ wanting. Thorax coarsely but more sparsely punctured, and scutellum polished, with a few shallow punctures. Appears to be closely related to *M. bicolor*, *Cress.*, but has first segment black.

Pamphilius pacificus, *Nort.*—Kirby; *List Hym. Brit. Musm.*, Vol. I., p. 348.

Macroxyela, sp. nov.? One ♀ labelled as captured on oak. May 12th, 1896.

URO CERIDÆ.

Urocerus abdominalis, *Harris*.—Two specimens ; probably males of *albicornis* or *flavicornis*.

Urocerus albicornis, *Fabr.*—One ♀.

Urocerus apicalis, *Kirby*.—*List Hym. Brit. Musm., Vol. I., p. 377, ♂* ; probably the male of *cæruleus*.

Urocerus cæruleus, *Cress.*—♀ described from V. I. coll., H. Edw. Mr. Fletcher has taken it at New Westminster, B. C.

Urocerus caudatus, *Cress.*—One ♀ and one ♂.

Urocerus cyaneus, *Fabr.*—One ♀.

Urocerus flavicornis, *Fabr.*—One ♀. Recorded by Taylor as "common in autumn."

Urocerus flavipennis, *Kirby*.—Five ♀. A large, handsome insect, but probably a form of *albicornis*.

Urocerus Morrisoni, *Cress.*—One ♀. This is doubtless a *var.* of *caudatus*.

Urocerus varipes, *Smith.*—One ♀. Very close to *cyaneus*.

ORYSSIDÆ.

Oryssus Sayi, *Westw.*—One ♀. Also a ♂ of *var. occidentalis*, *Cress.*

CYNIPIDÆ.

Ibalia ensiger, *Nort.*—One ♀ received by Mr. Fletcher.

Onchyia Provancheri, *Ashm.*—One ♀ ; 4th June.

EVANIIDÆ.

Aulacus pacificus, *Cress.*—♀ described from V. I. coll., Crotch.

ICHNEUMONIDÆ.

Ichneumon atrox, *Cress.*—One ♀ ; 6th June. Also one ♀ to Mr. Fletcher.

Ichneumon cæruleus, *Cress.*—Taylor ; CAN. ENT., Vol. XVI., p. 91. One ♀ to Mr. Fletcher.

Ichneumon cestus, *Cress.*—Three ♀. Species was described from V. I. coll., H. Edw. A common species, easily recognized by single black band on abdomen. Mr. Fletcher has numerous examples from Mr. Danby.

Ichneumon compar, *Cress.*—♀ described from V. I. coll., H. Edw.

Ichneumon creperus, *Cress.*—Three ♂.

Ichneumon difficilis, *Cress.*—This insect was described from Cal., but a *var.?* is noted from V. I. coll., H. Edw.

Ichneumon inconstans, *Cress.?*—One ♂.

Ichneumon infucatus, Cress.—Cat. Hym. N. Am., p. 185. One ♂ received by Mr. Fletcher.

Ichneumon insolens, Cress.—Taylor, *loc. cit.*: "One specimen bred from chrysalis of *Vanessa antiopa*."

Ichneumon lividulus, Prov.—One ♀ received by Mr. Fletcher, labelled *Ich. grandis*, determined by Mr. Brodie. Seems, from the partially rufous legs, etc., to belong rather to this species.

Ichneumon longulus, Cress.—Taylor, *loc. cit.* A specimen so labelled, received by Mr. Fletcher, is, however, only the ♂ of *cestus*, varying a little from typical coloration.

Ichneumon nunciis, Cress.—Three ♂s; also four received by Mr. Fletcher.

Ichneumon occidentalis, Hargtn.—Type ♀ in my collection.

Ichneumon otiosus, Say.—Taylor, *loc. cit.*: "My only specimen was unfortunately destroyed during the process of examination."

Ichneumon rufiventris, Brullé.—One ♀ labelled *insolens* apparently belongs to this species.

Ichneumon russatus, Cress.—Two ♀s. Type was from V. I. coll., H. Edw.

Ichneumon sagus, Cress.—One ♀ received by Mr. Fletcher.

Ichneumon salvus, Cress.—The ♂ was described from V. I. coll., H. Edw.

Ichneumon scibilis, Cress.—One ♂.

Ichneumon seminiger, Cress.—Taylor, *loc. cit.* Not seen.

Ichneumon sequax, Cress.—Type ♀ was from V. I. coll., H. Edw. Taylor (*loc. cit.*) says: "Very common; one specimen was bred from the chrysalis of a *Lycæna*."

Ichneumon Taylori, Hargtn.—Type ♀ in my collection.

Ichneumon vancouverensis, Prov.—Type ♂ was from coll. Taylor, who says (*loc. cit.*), "This fine insect is abundant, and I have bred it in some numbers from the pupa of a *Bombyx*." Not seen, but answers to description of *neutralis*, Cr., from Cal.

Ichneumon variegatus, Cress.—One ♂ to Mr. Fletcher.

Hoplismenus pacificus, Cress.—♀ ♂ described from V. I. coll., H. Edw.

Amblyteles hudsonicus, Cress.—Two ♀s. One of these is a *var.* with the head and thorax above rufous. Mr. Fletcher also has one ♀.

Amblyteles nubivagus, Cress.?—One ♂ *var.*?

Amblyteles perluctuosus, Prov.—One ♀.

(TO BE CONTINUED.)

BOOK NOTICES.

Rules for regulating nomenclature with a view to secure a strict application of the law of priority in entomological work; compiled by Lord Walsingham and John Hartley Durrant (Merton rules). Longmans, Green & Co., London., New York, and Bombay; 2nd Nov., 1896; 18 pages. Price sixpence.

The rules are for the most part a good statement of current practice, with the suggestion of a considerable number of signs to facilitate brevity of reference without loss of accuracy. These may advantageously be adopted.

Rules 7, 20, 21, 24, 25, 29 and 30 imply a much more rigidly classical attitude in regard to names than is prevalent in America. The authors would have all names according to the rules of Latin orthography, and would change those that are not, even so radically as *gypsodactylus* for *cretidactylus*. Names with similar sound are rejected; e. g., *Ucetia* invalidates *Euesia*; also those which involve a false proposition, or are offensive politically, morally, or by irreverence.

Rule 12 defines publication as including the possibility of purchase. If the rule be not extended, it would invalidate all species published in Government or private papers which are distributed without charge.

The definition of a genus by designation of type without description is not referred to, and apparently is condemned by implication.

The case of restriction of a heterotypical genus to one type by the successive removal of species to other genera by subsequent authors is not explicitly stated, and might well be added to rule 42.

A few rules about the formation of family names might have been added, for example:

1. Family names shall be formed by adding —idæ to the stem of some genus included in the family.
2. The generic name so used must be a valid one.
3. The first generic name used in a plural form shall be the one so used for the family type unless it be invalid, in which case the next generic name included in the family, which has been used in a plural sense, shall be substituted according to the rule of priority.

HARRISON G. DYAR.

MONOGRAPH OF THE BOMBYCINE MOTHS: *I. Notodontide*; by Alpheus S. Packard, M. D., National Academy of Sciences, Vol. VII.

This magnificent work is, without doubt, an immense credit to the author, and will take a permanent place among the triumphs of American Lepidopterology. It is not my intention to discuss matters of general classification or nomenclature here. My reasons for differing on certain points as to the latter have all been given elsewhere, and the merits of the Comstock-Dyar classification have been insisted upon by Dr. Dyar. Dr. Packard's work, as a whole, with its superb technical execution, has a value which could have been only enhanced by his attention to points of nomenclature, which I believe cannot be properly contradicted, and by his adhesion to a scheme of general classification, which I believe cannot be adequately gainsaid. I can here, out of my present limited knowledge, merely mention a few points, which may be of general or only of particular interest. There are a few errors in authorities. I do not know why my *Notodonta stragula* and *Schizura leptinoides* and *S. eximia* are given to Grote and Robinson (plates). Nor do I know why my name is placed in brackets after *Heterocampa Belfragei*. I described the latter as a *Heterocampa*, and have no responsibility for its having been placed under *Litodonta*, a reference which never occurred to me. I differ from Dr. Packard as to the validity of *Litodonta*. The costa is straighter, the primary fuller outwardly over internal angle, apex sharper, while the antennal structure is decisive, as compared with *Heterocampa subrotata*; the orange spots are peculiar. *H. subrotata* is a miniature *obliqua*, and is placed next in my list. *H. celtiphaga* is founded on obscurely marked and small specimens, probably not different specifically. *Litodonta* may be a more specialized form, from the character of the female antennæ; the discovery of the larva will be attended with interest. The unhappy influence which Mr. Walker has exercised is very apparent, and the synonymy of *Schizura ipomeæ* exhibits this at its worst. I do not insist upon the validity of *S. telifer* as a species; the black streaks are very distinct in both sexes and our nomenclature was invented to designate such forms, if not as species then as varieties. With regard to *Hyarpax*, and in connection with Dr. Packard's remarks upon *H. perophoroides*, I again draw attention to my previous statements as to Abbot and Smith's plate, that the figure of the female *aurora* at least approaches that form. The late Mr. Hy. Edwards sent me at one time a damaged specimen (I think without head or feet) of a well-sized pink

and yellow moth from Colorado, resembling this genus or *Anisota rubicunda* in colours. I would not describe it, but returned it as a probably new Noctuid. The figure of *Euhyparpax* distantly recalls the specimen, which must be in coll. Central Park Museum. The figure (Plate VI., 14) certainly does not look like a Ptilodont, rather like an Agrotid, but, especially an uncoloured figure, may be deceptive.

A short classification of the *Melalophidæ* may be found in 'Entomologist's Record,' VIII., 107, but I find since that *Phalera*, Hübn. Verz., 147, 1816, is preoccupied by *Phaleria*, Latreille, 1804. Another name must be used for the genus of *bucephala* and the subfamily of which I made it the type. As to *Datana*, I rather missed an allusion to the fact that Grote and Robinson first drew attention that there were many closely allied species, and to the characters of the uneven margin, differences in the lines and general tinting which serve to distinguish the moths. One paper in Vol. VI. of the Proceedings Ent. Soc., Phil., was an answer to the criticism passed by the late Mr. Walsh upon our previously described *Datana perspicua*. There is still a memorandum in my note-book of a reference in this genus which I do not seem to have published and which I do not find in either Packard or Dyar.

A. RADCLIFFE GROTE, A. M.

PRELIMINARY NOTES ON THE ORTHOPTERA OF NOVA SCOTIA; by Harry Piers. Transactions of the N. S. Institute of Science, Vol. IX., 1896.

So little attention is paid to Entomology in the Maritime Provinces that we gladly welcome this contribution to the subject and are much pleased that Mr. Piers intends to devote some years to the study of the order Orthoptera. The paper before us gives some very interesting notes on the habits and range of fourteen common species of cockroaches, crickets, and locusts, and describes more at length the ravages committed by *Melanoplus atlantis* on Sable Island, a hundred miles off the coast of Nova Scotia in the Atlantic Ocean.

C. J. S. B.



CAN. ENT., VOL. XXIX.

PLATE 2.



REV. THOMAS W. FYLES, F. L. S.

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THE REV. THOMAS W. FYLES, F. L. S.

We have much pleasure in presenting to our readers the excellent portrait of our colleague, the Rev. Thomas W. Fyles, who has been for many years an active member of the Entomological Society of Ontario. Though living at South Quebec, he has regularly attended the annual meetings at London, travelling many hundreds of miles in order to do so, and has invariably delighted those present with his excellent papers. He was a member of the Council from 1882 to 1888, when the change in the Act of Incorporation required the directors to be resident within certain districts of the Province of Ontario. Three times he has represented the Society as their delegate to the Royal Society of Canada at Ottawa, and he has been a member of the editing committee of the CANADIAN ENTOMOLOGIST since 1889. While filling the arduous position of chaplain to the immigrants landing in Canada, under the auspices of the Society for Promoting Christian Knowledge, he devotes any spare moments that he can get to the study of entomology. He has succeeded, with an energy and enthusiasm worthy of admiration, in forming an extensive collection of insects, and acquiring a knowledge of the science beyond what is ordinarily met with. That he may long continue to carry on his excellent work, both in his official position and in his scientific pursuits, is the hearty wish of all his friends.

A PARASITE OF HEMIPTEROUS EGGS.

BY T. D. A. COCKERELL, MESILLA, N. M.

The following description is offered of an insect to which I shall have occasion to allude in a forthcoming Bulletin, wherein such descriptive matter would be inappropriate.

Hadronotus mesilla, n. sp.—♂. Length slightly over 1 mm.; black; coxæ black, legs otherwise rufous. Antennæ dark rufous, arising just above mouth, delicately pubescent; pedicel oval, shining, punctured, conspicuously shorter than the long first flagellar joint; second flagellar joint shorter than the first, but fully twice as long as broad; third to fifth joints oval, shorter than the second, the third slightly longer than the

following, all longer than broad. Head short, broadly transverse, slightly broader than thorax; lateral ocelli separated from the eyes by a space about equal to their own diameter; a depression in front of middle ocellus. Frons and face minutely reticulated by grooves, reminding one of crocodile hide. Thorax subglobular, somewhat broader than long, with very sparse short pubescence; anterior part of mesothorax very indistinctly subreticulately sculptured, its anterior margin with a distinct row of pits. Hind portion distinctly but very delicately and minutely reticulated with raised lines. Scutellum smooth, with a few hairs; hind margins of scutellum and postscutellum with a row of pits. Abdomen short and broad, carinated at sides, smooth, rather shiny. Wings hyaline, quite hairy, fringe short, nervures rufescent; marginal vein short, not half length of stigmal.

Habitat.—Las Cruces, New Mexico; bred from eggs of some Hemipteron, apparently Pentatomid. The eggs are barrel-shaped, pale gray with a white base and a white ring at top, the lid with a white central ringlet, and its suture white. Only one specimen was bred, and the tips of its antennæ are broken off, but the species differs at once, by its reticulate sculpture and other characters, from all those described by Mr. Ashmead in his Monog. Proctotrypidæ or in his work on the Hymenoptera of St. Vincent. Another parasite of Pentatomid eggs occurs in the Mesilla Valley, namely, *Trissolcus euschisti*, Ashm. (a Mesilla example det. Ashm.). With us, I believe it is a parasite on the eggs of *Brochymena obscura*, H. S., which abounds in orchards.

NOTES ON VANESSA INTERROGATIONIS.

BY W. F. FISKE, MAST YARD, N. H.

I remember about ten years ago to have taken several large specimens of a Grapta, probably *G. interrogationis*, but they were lost without being identified. I saw no more of the species until August, 1895, when I took a fine example of the form *Fabricii*. It proved to be the forerunner of a "wave" of the species, and from that date until frost a number were seen, perhaps in all twenty or more, but all but two of them were of the form *Fabricii*. This spring I watched the hibernating butterflies closely, hoping to obtain a fertile female and rear a brood of larvæ, but although there were many *G. comma* and *j-album*, and a few *progne* and *faunus*, on the wing throughout April, I did not observe one *interrogationis* amongst them. By the middle of May the other species of Grapta had

disappeared, or were represented by a few specimens worn almost beyond recognition. I had about given up meeting with *interrogationis* that spring, when on the 16th of May I captured a large but badly worn *umbrosa* fluttering over lilac blossoms. I was surprised that it should be of this form instead of the more common *Fabricii*, but what was my astonishment to see four or five more of the same form the same day. During the rest of May and first part of June the species was common, but not one *Fabricii* was seen. A large female was captured while ovipositing on elm, and netted over a branch of that tree. She deposited a large number of eggs indiscriminately on leaves, branch, and net, in most cases singly, but in a few instances in "chains" of three or four. In order not to disturb the eggs, I let the net remain as it was until the larvæ should hatch, and then, thinking that the larvæ would do better in the open air, left it until they had passed the second moult, when on removing it I found only eight remaining. These pupated without further accident, and on the 13th of July and the few days following five imagoes emerged—three *Fabricii* and two *umbrosa*. This was after the larger part of the brood of *j-album* had emerged and several weeks after the first brood of *comma*, and as the former species is probably but single brooded here, I was not expecting a second brood of *interrogationis*. It was with some surprise, therefore, that a large colony of young larvæ were discovered in the latter part of August feeding on the heads of hops. Later several other colonies were found on hop and elm, and a number of larvæ were transferred to my breeding-boxes and carried successfully to pupation, but as many of the pupæ rotted, only about thirty imagoes, all *Fabricii*, were obtained. The last specimen, delayed by a long continued "spell" of severe weather, did not emerge until November 6th, after being in the pupa state nearly six weeks and freezing at least once. It was smaller and darker than the average, but not otherwise remarkable.

Now, the question which I wish answered is, Where did the large number of *umbrosa* come from that appeared here so suddenly in May? They certainly did not breed here, because every specimen seen was badly worn, and they could not have flown in any such numbers either the same spring or the fall before, and besides, the fall before it was *Fabricii* that was in the majority. The only explanation which I can offer is that they migrated thither from some other locality, probably in the South. *Pyrameis atalanta* appeared about the same time in very large numbers, but as the species has always been more or less common,

I did not think it so remarkable. The first brood of larvæ of this species are usually so scattering that it is difficult to find them. This summer they were so numerous as to completely strip large clumps of nettle, so that numbers of larvæ must have perished for want of food. Some large and healthy bunches of nettle were so weakened by the larvæ of this species and of *Vanessa Milberti* repeatedly stripping them of every green leaf that they have probably died.

LARVAL STAGES OF AMPHION NESSUS (Cr.).

BY WILLIAM BEUTENMÜLLER, NEW YORK.

Egg.—Pale green, almost globular; very similar to that of *Everyx myron*, but smaller. Young larvæ collected at Greenwood Lake, New Jersey, June 25th. Length, 1 mm.

Stage I.—Pale apple-green, with numerous minute white dots and a narrow white subdorsal stripe along each side, beginning at the anterior part of the first segment and running to the base of the caudal horn, which is black, and brown at the base. Length, 9 mm. Moulded June 28th.

Stage II.—Very much like the preceding stage, but the white dots and the subdorsal stripe are much heavier and more distinct. Caudal horn jet black, reddish-brown basally. Head with a narrow white stripe on each side. Length, 13 mm. Moulded July 1st.

Stage III.—Much like the last stage, but the stripes on the head are continuous with the ones on the subdorsum; the third and fourth segments are now considerably swollen and thicker than the remaining segments. Caudal horn black, reddish-brown at the base. Spiracles black. Length, 17 mm. Moulded July 4th.

Stage IV.—Same as the last stage. Length, 22 mm. Moulded July 7th.

Stage V.—The general colour is now dirty orange-brown, speckled with small smoky-black dots. On the junction of the segment along the dorsum is a smoky-black spot, and along the sides is a series of oblique smoky-black bands, the last one running to the base of the caudal horn, which is black. From the head to the end of the third segment are three black stripes, one on the dorsum and one on each side on the subdorsum. Head dirty purplish-brown, with a whitish stripe on each side. Under side darker than above. Length, 45 mm. Full-grown July 18. When fully fed the larva spins a rude cocoon between a few leaves on the ground.

Food-plants: Grape and Virginia creeper.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XX. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC — (*Continued*).

TRIBE IX. — GALERUCINI (Sub-tribe HALTICINI).

The "jumping beetles," or "flea beetles," constitute the above sub-tribe, and are separated from the genuine Galerucini by the fact that the hind thighs are greatly enlarged and thickened for leaping. Most of the species are quite small, though a few are of moderate size for this family, and a considerable number of them are prettily coloured. They are of great importance from an economic standpoint, a number of them being quite injurious. The identification of some of the members of this group is attended with considerable difficulty, yet most of the genera have a peculiar facies, which, once grasped, renders the proper location of additional specimens tolerably certain.

The sub-tribe has recently been worked up in detail, as far as the North American species are concerned, by Dr. Horn, from whose paper on the "Halticini of Boreal America" most of the tables and specific diagnoses have been condensed. His paper has rendered possible an intelligent survey of the group — something heretofore lacking in the American literature on the subject. The diagrams representing elytral markings are reproduced from the figures given in his article.

- A. Last joint of hind tarsi globosely inflated; elytra with confused punctuation, surface glabrous. Size, large or moderate. *Edionychis*.
- AA. Last joint of hind tarsi not globose, usually slender, sometimes thickened when viewed laterally.
 - b. Anterior coxal cavities open behind. Mesosternum visible.
 - c. Prothorax without antebasal transverse impression, hind tibiæ faintly or not grooved.
 - d. Moderate or large sized species, first joint of hind tarsi short, as compared with tibiæ, and rather broad. *Disonycha*.
 - dd. Small species, first joint of hind tarsi long and slender.
 - Hind tibiæ grooved on outer edge, first joint of hind tarsi as long as one-half the tibia *Longitarsus*.
 - Hind tibiæ not grooved, slightly excavated near tip; first joint of hind tarsi about one-third as long as tibia *Phyllotreta*.

- cc. Prothorax with antebasal impression, which is transverse, usually feeble and not distinctly limited at each extremity *Haltica*.
- bb. Anterior coxal cavities closed behind.
- e. Antennæ 11-jointed, approximate at base.
- f. Posterior tibiæ sinuate near the apex, the sinuation limited above by a distinct tooth; first two ventral segments connate, but with distinct suture; thorax without antebasal impression *Chatocnema*.
- ff. Posterior tibiæ without either sinuation or tooth.
- g. Thorax with distinct antebasal transverse impression, usually well limited at its ends. Elytra punctato-striate.
- h. Elytra glabrous.
Form more or less ovate; antennæ moderate *Crepidodera*.
Form elongate, parallel; antennæ as long or longer than body *Orthaltica*.
- hh. Elytra with rows of setæ on interstices, giving a pubescent appearance. Form short, ovate; antennæ not elongate *Epitrix*.
- gg. Thorax without *transverse* antebasal impression.
- i. Spur of hind tibia small and slender.
Thorax with short, deep *longitudinally* impressed line each side; elytra punctato-striate, paler at tip *Mantura*.
Thorax without impression, elytral punctuation confused *Systema*.
- ii. Spur of hind tibiæ broad, emarginate at tip *Dibolia*.
- ee. Antennæ 10-jointed, hind tibiæ prolonged beyond the insertion of the tarsus, which is placed rather on the outer side, above the apex *Psylliodes*.

CEDIONYCHIS, Latr.

The species of this genus are of large or moderate size (for Halticini) and are readily recognizable on account of the inflated or globose claw-joint of the hind tarsi. Some of them are of bright colours and handsomely marked. The Canadian forms are thus separated by Dr. Horn :

- A. Antennæ stouter, scarcely one-half the length of the body; species larger and more convex, front of head oblique, elytra never explanate at sides.

b. Elytra entirely blue, green, violaceous, blackish or testaceous.

c. Body never entirely black beneath.

Elytra bright blue or green, thorax smooth; body beneath entirely pale. .18-.28 in. *gibbitarsa*, Say.

Elytra violaceous or greenish-black, thorax more or less distinctly punctate, body beneath in great part dark, thorax yellowish with a large piceous space or M-like mark blackish. .16-.28 in. *vians*, Ill.

cc. Body entirely black beneath, upper surface dull black, impunctate. .18-.22 in. *Jugens*, Lec.

bb. Elytra with pale margin, disk violaceous or bluish.

Thorax and elytra coarsely and closely punctate.

.20-.26 in. *thoracica*, Fabr.

Thorax and elytra indistinctly punctured; elytra brilliant violaceous. .20-.24 in. *flavocyanea*, Cr.

AA. Antennæ slender, equal to or greater than one-half the length of the body; front of head vertical; elytra with explanate margin.

d. Elytra broadly oval, sides much arcuate, coarsely punctate; may be yellowish with indistinct vitta, or black with only the margin pale. .14-.20 in. *limbalis*, Mels.

dd. Elytra with sides feebly arcuate or nearly parallel; yellowish, with indistinct brown spots and bands or with the disk entirely piceous.

e. Thorax very coarsely punctured; elytra with a more or less evident costa extending from humeri to apex, yellowish with blackish spots which sometimes coalesce to form an X, behind which is an irregular transverse band.

.14-.16 in. (fig. 5).... *sexmaculata*, Ill.

ee. Thorax finely punctured or smooth.

Head coarsely punctate, punctures closely placed; yellowish; elytra with base, suture, and often two spots on each, brown. .14-.16 in. *suturalis*, Fabr.

Head sparsely punctate or nearly smooth; thorax often entirely yellow, or may be piceous with the margin pale; elytra piceous with yellow margin,



FIG. 5.

rarely with two large yellowish spots on each.

.14-.15 in. *quercata*, Fabr.

While *flavocyanea* is included in the above table, on account of its being recorded in the Society's list, it has probably been identified in error, since it is a Southern species.

DISONYCHA, Chevr.

Also contains large or moderate sized species, some of them even exceeding *Edionychis*, which they often resemble in markings, but they may easily be separated therefrom by the claw-joint of the hind tarsi not being swollen. They separate thus :

A. Elytra not striped.

Thorax yellow with three black spots arranged in the form of a triangle ; under surface of body and the legs black .20-.25 in. *triangularis*, Say.

Thorax yellow, not spotted; abdomen yellow, femora usually yellow at basal half. .21-.23 in. *xanthomelana*, Dalm.

AA. Elytra striped.

b. Form very elongate; elytra vaguely grooved; thorax somewhat uneven.

Body beneath black, except sides of thorax, which are margined with yellow. Black spot on disk of thorax very large. var. *limbicollis*, Lec.

Body beneath partly black, abdomen paler at sides and apex, thorax with under surface entirely yellow, discal spot on upper surface smaller. .26-.30 in. *pennsylvanica*, Ill.

bb. Form not very elongate; elytra and thorax even, the former with discal and submarginal vittæ.

c. Abdomen densely punctured, conspicuously pubescent.

d. Head coarsely punctured from side to side. .22-.36 in. *quinquevittata*, Say.

dd. Head smooth at middle.

Elytral vittæ rather broad, head and body beneath more or less clouded with darker, labrum piceous. .22-.26 in. *crenicollis*, Say.

Elytral vittæ narrow, head and body beneath always pale yellow, labrum pale. .20-.26 in. *caroliniana*, Fabr.

cc. Abdomen very sparsely punctured, pubescence scarcely visible.

Thorax smooth, head rough, epipleura black. .20-.22
in. *glabrata*, Fabr.

It is quite likely that *glabrata* may have been recorded in error; the species called *5-vittata* is the one everywhere identified as *alternata*, and so recorded in the Canadian lists; while *crenicollis* and *caroliniana* are inserted in the table, with the characters assigned them by Dr. Horn, since it is, to my mind, likely that one of these is the species which was mistaken for *glabrata* by the Canadian recorder.

HALTICA, Geoffr.

The species belonging here are of moderate size, none of them with markings of any sort on the upper surface of the body, which is blue, green or bronzed, and usually shining. The thorax is marked near the base with a transverse more or less distinctly impressed line, which has been used as a means of differentiating species. The following table is a tolerably close copy of that of Dr. Horn, and will serve to distinguish the recorded Canadian forms with some degree of accuracy.

A. Elytra with a prominent lateral plica along the lateral submargin, giving the appearance of a double margin. .20-.24
in. *bimarginata*, Say.

AA. Elytra not plicate.

Thorax with deep antebasal groove extending *completely* across.

Larger (.16-.20 in.) usually blue, form robust, thorax distinctly wide at base. *chalybea*, Ill.

Smaller (.12-.16 in.) metallic, brassy, blue, green or bronze.

Elytra distinctly sparsely punctate at base, more faintly toward apex. *ignita*, Ill.

Thorax with transverse antebasal groove, which is not entire.

Transverse impression, ending in a fovea on each side. .18
in. *evicta*, Lec.

Transverse impression gradually evanescent at either end.

Impression deep, humeri of elytra well marked, thorax relatively coarsely punctate. Elytral punctuation coarser than usual. Colour more or less coppery, sometimes nearly blue. .14-.18 in. *carinata*, Germ.

Impression feeble, almost obliterated; humeri rounded, thorax sparsely punctulate, elytra scarcely visibly punctate, colour bright green to dark blue. .14-.18 in. *foliacea*, Lec.

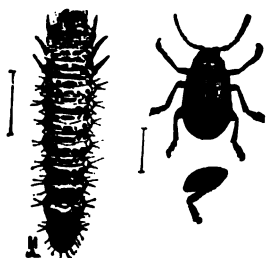


FIG. 6.

It should be remarked that *evicta* is a Pacific Coast species (found in Oregon), of which I have seen no Canadian examples; while *foliacea* is Southern, occurring in Texas, Colorado, New Mexico, and Arizona. *H. inarata*, Lec., is synonymous with *ignita*.

(Fig. 6 represents the larva and beetle of *H. chalybea*, and a leg of the latter, showing the greatly thickened thigh.)

CREPIDODERA, Chev.

The best known species of this genus is *Crepidodera helxines*, a bright metallic blue or green flea beetle, very commonly found on willows. All of the members belonging here are quite small, and do not resemble each other at all closely, so that reference should be had to the generic characters (as laid down in the table of genera) before trying to place any presumed *Crepidodera*s by the following specific analysis, which is that of Dr. Horn:

Form oblong-oval; elytra uniform in colour with the head and thorax, surface metallic, blue or green; thoracic punctuation abundant, intermixed. .09-.13 in. *helxines*, Linn.

Form oval, narrowed in front; colour piceous, with slight aeneous lustre, apical third of elytra indeterminately testaceous. .08-.10 in. *modeeri*, Linn.

Form broadly oval and convex; colour rufotestaceous, without metallic lustre; abdomen piceous, prothorax not distinctly punctured. .06-.07 in. *atriventris*, Mels.

EPITRIX, Foudras.

Contains one Canadian species, *E. cucumeris*, Harr., the "cucumber flea beetle" (fig. 7), which is often found very abundant on potato vines. It is a small (.06 to .08 in.), ovate, slightly oblong beetle, nearly black in colour, the legs reddish or brownish, femora often darker. It may easily be told from any of the *Crepidodera*s or other genera which might otherwise resemble it, in our fauna, by the fact that the upper surface is pubescent. The thoracic punctures are well separated from each other; the elytral striæ, especially near the suture, very feeble.



FIG. 7.

ORTHALTICA, Crotch.

O. copalina, Fabr., is an elongate-parallel insect, of shining surface, brownish or blackish in colour. .08-.10 in. long. The antennæ are more elongate than usual in the Halticini, equaling about two-thirds of the length of the body in the male, somewhat shorter in the female. The antennæ and legs are rufotestaceous, the thorax is broader than long, sides arcuate, margin finely serrate, punctures coarse and deep, but not densely placed. Elytra with nine striæ of closely-placed coarse punctures, intervals narrower than the striæ. I have found this species in abundance on the flowers of sumach.

SYSTEMA, Clark.

The species of this genus are rather elongate, somewhat depressed or only moderately convex in form. The antennæ are about one half the length of the body. Some of them are injurious to cruciferous plants. Two of the Canadian species are dark, the other two pale or vittate. They may be separated thus:

Black, head reddish. .14-.20 in. *frontalis*, Fabr.

Black, head not red; joints 3, 4, 5 of antennæ testaceous. .18 in. *hudsonias*, Forst.

Elytra pale or striped.

Surface shining, punctuation fine; may be entirely pale, or the elytra may be vittate. Under side of body and sides of thorax often piceous. .12-.18 in. *teniata*, var. *blanda*, Mels.

Surface subopaque, punctuation coarse, close and deep. .14-.16 in. *marginalis*, Ill.

LONGITARSUS, Latr.

Three species have been reported from the region under discussion. They all belong to the division of the genus in which the fourth antennal joint is not longer than the second, and are distinguished by the use of the following characters in the table of Dr. Horn:

Surface entirely shining, form robust, elytral humeri well marked, punctuation rather coarse. Colour blackish. .07 in. *erro*, Horn.

Surface more or less alutaceous, thorax always so, form more elongate, humeri not prominent.

Elytra not shining, punctuation very indistinct; colour yellowish-testaceous. .07-.08 in. *testaceus*, Mels.

Elytra shining, punctuation coarse; colour dark rufotestaceous to nearly piceous. .08 in. *melanurus*, Mels.

GLYPTINA, Lec.

Species of this genus will almost certainly be found in Canada. They have the elytral punctuation disposed in rather regular striæ, while in *Longitarsus* the punctures are confused. Otherwise there is considerable similarity between the two genera, as far as aspect is concerned.

PHYLLOTRETA, Foudras.¹

Contains a few species only, the Canadian ones all being of a piceous colour, more or less aeneous or greenish, shining, the elytra marked with yellow stripes or spots. (*P. vittata*, fig. 8.) Often injurious by their great abundance; they are to be seen on the leaves of horse-radish, wild mustard, and various allied plants, wild or cultivated. It should be noted that the record for *lepidula* ought to be carefully verified, since the species is Californian. *P. sinuata* has been included in the table, though not actually known to occur in Canada.

A. Fifth joint of antennæ much enlarged (♂) or longer than the sixth (♀). Elytra usually vittate, rarely spotted.



FIG. 8.

b. Elytral vitta simple, narrow, nearly straight, but incurved at the apex. .08-.10 in. *lepidula*, Lec.

bb. Elytral vitta sinuous, more or less dilated or appendiculate at ends.

Vitta incurved at base, approaching the scutellum; intermediate portion sometimes wanting, leaving the apical parts in the form of spots (fig. 9a.). .08 in. . . *vittata*, Fabr.

Vitta parallel with suture at its basal half. .10 in. (fig. 9b). *sinuata*, Steph.

AA. Fifth joint of antennæ not modified; fifth joint not longer than sixth in either sex. Piceous, not metallic. Each elytron with two oval yellow spots, one humeral, the other near the apex. .08-.10 in. *bipustulata*, Fabr.



FIG. 9.

MANTURA, Steph.

Represented by *M. floridana*, Cr., an oval, somewhat elongate, moderately convex beetle, of a brownish colour, faintly bronzed above; thorax without transverse antebasal impression, longitudinal basal impressions deep and triangular. Elytra indefinitely paler at apical third. Legs reddish, hind femora darker, each of the tibiæ with a terminal spur. In colour this species somewhat resembles *Crepidodera modeeri*, Linn.,

but that insect has a moderate transverse antebasal impression on the prothorax. Length, .08 in.

CHÆTOCNEMA, Steph.

This is a large genus, well represented in the United States. The Canadian list contains only three species, one of which (*alutacea*, Cr., known from Georgia and Florida) may be erroneously cited, leaving only *denticulata*, and *parcepunctata* as undoubted natives. Several are known from the Lake Superior region, and some of them must undoubtedly occur in Ontario. Following Dr. Horn's arrangement, these recorded forms may thus be known; all of them belonging to the group in which the sides of the thorax are not obliquely truncate at the front angles.

Head distinctly punctate; upper surface of body bright bronze or brassy; elytral striæ of coarse deep punctures, the scutellar series usually irregular, the remainder not confused. Form oval, not elongate, clypeo-frontal region subopaque. .08-.10 in.*denticulata*, Ill.

Head impunctate.

Thorax with entire basal marginal line, which is not defined by punctures; legs entirely piceous, surface subopaque. .06-.08 in.*alutacea*, Cr.

Thorax finely and sparsely punctate, with basal marginal row of distinct punctures, surface shining. Femora piceous, tibiæ and tarsi brownish or rufotestaceous. .06 in.*parcepunctata*, Cr.

DIBOLIA, Latr.

The form of the spur of the hind tibiæ (broad with a distinct emargination at tip) will in itself define the genus. *D. borealis*, Chevr. (= *area*, Melsh.), is recorded from Canada and is about .12 in. long, oval, convex, robust, the surface bronzed, elytral striæ of coarse punctures; anterior and middle legs and hind tibiæ reddish.

PSYLLIODES, Latr.

Antennæ ten-jointed, inserted against the inner border of the eye, hind tarsi inserted before the end of the tibiæ and slightly to the outer side, first joint more than half the length of the tibia. The Canadian species is *P. punctulata*, Mels., a bronzed beetle .08-.10 in. long, of elongate-oval, rather convex form, thorax at base not narrower than the elytra, which are punctato-striate, the punctures coarse and deep, closely placed. The male has the last ventral distinctly impressed.

ON LEDRA PERDITA, A. & S.

BY CARL F. BAKER, AUBURN, ALABAMA.

On page 577 of their great work on the Hemiptera, Amyot and Serville describe two species of *Ledra*. One, *L. aurita*, the well-known species of Europe, was characterized from specimens collected near Paris. I have specimens of it now before me. Its size, the broad membranous prolongation of the head, the ear-shaped horns on the thorax, together with other details of structure, separate it widely from any other homopterous insect. The other species described, *L. perdita*, though equally unique in form, was characterized under circumstances which, for such eminent scientists as Amyot and Serville, seem extraordinary. After a three-line description, they remark: "L'exemplaire unique d'après lequel cette espèce a été figurée, ayant été détruit, nous la décrivons d'après la figure." Unfortunately, the figure, number five on plate II., is very poor. The species is credited to "Amérique septentrionale."

Since that time the species has never again been recognized, although often noticed in hemipterological literature. Mr. Van Duzee, in his "Catalogue of the Jassoidea," lists it as an unquestionable *Ledra*, and gives its habitat as Pennsylvania, on the authority of Amyot and Serville.

It is perfectly evident from the figure that the species is not a *Ledra*. It lacks utterly the characteristic head structure of *Ledra aurita*. It is equally evident that the figure is that of a Membracid belonging in the Centrolinæ, near *Microcentrus caryæ*, Fh. Indeed, Dr. Goding tells me Fitch himself noticed this resemblance.

During several years past I have been receiving quantities of material in Homoptera from many localities in Pennsylvania and throughout the East. This material is the result of careful work by good collectors, and contains immense series of the native Membracids and Jassids. In the examination of this material I have been constantly on the watch for *Ledra perdita*. Lately it has occurred to me in several specimens from Pennsylvania, New Jersey, and Indiana, collected by Messrs. Dietz, Liebeck, and Weith. There is nothing else among all the American material I have examined that is at all like this species, with the single exception of *Microcentrus caryæ*, and that lacks the long ear-shaped horns on the thorax. So peculiar in form is it that there is not a possibility of confusing it with anything else in our fauna.

And not until another species from the same region shall have been discovered, having closer affinities with it than has *Microcentrus caryæ*, will there be any reasonable grounds for doubting that this, which I so refer, was the form which Messrs. Amyot and Serville described under the name *perdita*.

I forwarded specimens of the species to Dr. Goding, and was much surprised to learn that it was identical with his *Centruchus Liebeckii*, also from Pennsylvania, described on page 471 of the List of N. A. Membracidae. In a letter he cites the genus as "*Centruchoides*," which I suppose to be a manuscript name founded on this species. I, however, believe this species (which in future must be known as *perdita*, A. & S.) to be congeneric with the *caryæ* of Fitch. I have specimens of *caryæ* with rudiments of thoracic horns. Outside of this character the species are very closely related.

I have yet to see a true *Ledra* from either North or South America.

SOME NEW SPECIES AND VARIETIES OF LEPIDOPTERA FROM THE WESTERN U. S.

BY WM. BARNES, M. D., DECATUR, ILL.

Argynnis Charlottii, n. sp.

♂.—Upper surface very much like *Cybele*; differs from *Leto* in the lighter shade of the ground colour and the much darker and more extensive basal area. This area is sharply limited at the outer edge and extends to the median row of markings, which on the hind wings are quite obscured by it. The apical region is not so clear as in *Leto*, the row of round spots in the outer belt continuing of large size up to the costa, and the dark blotch lying just within the upper three spots is very prominent, as in *Cybele*.

Under surface clearer, brighter, and markings less heavy than in *Leto*. The marginal brown shading very faint, and the submarginal row of crescents, which on the secondaries are very narrow but well silvered, have but a very fine edging of the same shade. The dark basal area stops sharply at the median row of silvered spots, as in *Cybele*, and is not present on their outer side, as in *Leto*.

♀.—Upper surface closely resembles *Leto*, the ground colour and basal area being the same. The markings are, however, not so heavy and the submarginal row of lunules do not so completely enclose the row of spots of the ground colour. On the under surface the markings

are not so heavy as in *Leto*; the apical region is clearer, the three or four brown spots so conspicuous in *Leto* being here wanting or but faintly indicated. The outer belt on the secondaries presents the same clean-cut character as in the male, owing to the absence of the brown shadings to its inner and outer sides.

Types.—1 ♂ and 2 ♀s in my collection, from Glenwood Springs, Colo.

This species stands intermediate between *Leto* and *Cybele*. The locality has been thoroughly worked for several years and no typical *Leto* taken there. I have *Leto* from Utah, California, Nevada, Oregon, Idaho, Montana, and British Columbia, and they are uniform in their points of difference from the form here described.

Melitaea Gillettii, n. sp.

♂ expands $1\frac{1}{2}$ inches; head and thorax black; abdomen black above, beneath yellowish-white; palpi and legs dark red; antennae fuscous; club yellow; wings, ground colour black, markings dull red and white, veins black. Primaries above show a wide margin of the ground colour, in which are two rows of spots; the margin red, very faint, scarcely discernible except towards apex; the second row is white, small and not very prominent; the third row is red, the spots are large, quadrate and completely fill the intercellular spaces, thus giving the appearance of a broad red band cut by the black veins; the fourth row is rather irregular, white and joined opposite the cell by a demi-row from costa; two red and two white spots in cell; two white spots and one red in subcellular space; basal area rather obscured with black.

Secondaries above have the four outer rows as on primaries, the marginal red row even fainter, two red and one white spot in cell and a white subcellular spot. The under surface shows but little of the black ground colour, it being reduced to the veins and lines between the rows of spots, which are all rather quadrate in shape, filling the intercellular spaces, thus giving a well-marked, banded appearance. The marginal band is red and is followed by the white, red, and white bands as on upper surface. The cellular and subcellular spots on primaries same as above, only larger and more distinct. On basal area of secondaries there are four white spots, separated by an irregular shaped red area, the result of a fusion of the red spots.

Described from seven ♂s taken in Yellowstone Park, Wyoming, July 18.

This species is very closely allied to *M. Iduna*, Dalm., of Lapland, but in that species the antennæ are black and the red band not half so wide. That a species so distinct from any other thus far described from N. A. should be turned up at this late day is remarkable, and shows the possibilities of many other interesting discoveries when the Park region is thoroughly explored.

Melitæa nubigena, var. *capella*.

In the Henry Edwards collection are specimens of a *Melitæa* separated under the above name; but in so far as I know, no description was ever published. The variations of *nubigena* are without number, yet they all come into one of three general classes. In Western Colorado and Utah the tendency is towards a gradual increase of the white at the expense of the red and black, producing forms allied to *Wheeleri*, Hy. Edw. Farther north in the Yellowstone region the tendency is to darker forms, the black replacing the red to such an extent that the spots are small and round, set in a black ground. Around Manitou and Denver forms occur which are of a solid brick red, the white being entirely gone and the black reduced to the veins and fine cross lines, the latter even being wanting in portions of the wings. On the primaries the spots at the costal end of the third row are the last to lose the white colour, and in most of the specimens there are traces of it remaining there. In some few males there is none whatever. The fourth row on the secondaries preserves the whitish colour the longest, but not so tenaciously as is the case on the primaries. In some specimens which have entirely lost the white, the black ground colour still remains well marked, while in others there is considerable fusion of the red spots, while considerable of the white is retained. It is to those dark red forms that Hy. Edwards applied the name *capella*, and I take pleasure in retaining the name proposed by him.

Described from eight pairs in my collection and others among my duplicates.

Colias pelidne, var. *Skinneri*.

Male, expanse $1\frac{1}{2}$ to $1\frac{3}{4}$ inches; upper surface of a greenish-yellow shade somewhat darker than *Scudderi*, lightly dusted with dark scales over costal two-thirds of primaries; marginal bands not so broad and cut less deeply by the yellow nervules than is the case in *Scudderi*. The inner margin of the border varies, being almost entire in some specimens,

dentate in others, and in a few erose. The discal spot on primaries black, much more distinct than in either *Scudderi* or *pelidne*. In some few specimens the spot is centered with a few yellowish scales, the spot on secondaries about the same as in *Scudderi*. Under side of primaries yellow, paler along the inner margin, thickly dusted with dark scales over costal two-thirds from base to just within the line where the inner margin of the black border of the upper surface shows through; discal mark faint—scarcely discernible in many specimens. Secondaries thickly dusted with dark scales over the basal three-quarters, discal spot prominent, dark brown ring, centre silvered or white, more or less covered with roseate scales; costa and fringes, except at inner angle of primaries, roseate. Antennæ roseate; club roseate below, brown above; collar, head, legs, and a spot at base of secondaries, roseate; palpi roseate above, yellow beneath; thorax and abdomen dark above, covered with yellow hairs, yellow beneath.

Female, expanse $1\frac{5}{8}$ to $1\frac{7}{8}$ inches; greenish-yellow or white, about evenly divided. Border well marked, varying greatly in extent. In some specimens, on the primaries it is broad, and entirely encloses a row of spots of the ground colour; in others, while equally broad, it is uniformly dark; from these there are all gradations down to one in which the black is restricted to the apical region, and to pear-shaped spots at the ends of the veins. On the secondaries the border is usually well marked, and extends in some almost to anal angle; in some examples, however, it is confined to the outer angle, as three or four blotches. The upper surface is less dusted with dark scales than in the male, the under surface about the same, the discal spots, fringes and other characters as in the male.

Described from 15 males and 7 females — three of which are yellow, three white, and one intermediate — taken in Yellowstone National Park, and at Arangie, Idaho, in July.

Mr. Bean, in CANADIAN ENTOMOLOGIST, Vol. XXII., p. 127, mentions specimens of a *Colias* intermediate between *Scudderi* and *pelidne*, and it is probable that this is the same, but as I have none of his material, and he gives no description of it, I am not certain.

Thymelicus Edwardsii, n. sp.

Upper surface bright golden-yellow, fringe dark brown within, lighter outwardly. Beneath primaries yellowish, except inner margin, which is shaded with black; hind wings yellow over the anal margin for one-third the width of the wing, rest grayish-yellow.

Type. — One male, taken near Denver, Colorado.

CATALOGUE OF THE PHYTOPHAGOUS AND PARASITIC
HYMENOPTERA OF VANCOUVER ISLAND.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

(Continued from page 21.)

Amblyteles subrufus, Cress.—One ♀ labelled *Ich. sequax*, received by Mr. Fletcher, appears to belong to this species. It is certainly not *sequax*.

Amblyteles suturalis, Say.

Amblyteles superbis, Prov.—Thirteen ♀s, including Provancher's type, which Mr. Davis has found to equal *suturalis* (CAN. ENT., Vol. XXVII., p. 287). They are yellower than Ottawa specimens, with sutural bands of abdomen weaker and sometimes wanting.

Amblyteles subfuscus, Cress.—Two ♀s.

Trogus buccatus, Cress.—♀ described from V. I. coll., H. Edw.

Trogus Edwardsii, Cress.—♂ described from same coll.

Trogus Fletcheri, Hargtn.—Type ♀ in my coll.

Platylabus pacificus, Hargtn.—Type ♀ in my coll.

Hemichneumon vancouverensis, Hargtn.

Hypocryptus vancouverensis, Hargtn.—Type ♂ in my coll. Mr. Davis informs me that this species belongs to *Hemichneumon*.

Phaenogenes discus, Cress.—One ♀.

Phaenogenes fungor, Nort.—Two ♀s.

Phaenogenes sectus, Prov.—One ♂. The species was described from coll., Taylor.

Centeterus canadensis, Hargtn.—Three types ♀ in my coll.

? *Herpestomus attenuatus*, Prov.

Phygadeuon attenuatus, Prov.—Taylor, *loc. cit.* Not seen.

Herpestomus orbis, Prov.

Phaenogenes orbis, Prov.—The ♀ of this species was described by Provancher from a specimen sent to him by Mr. Fletcher. Not seen.

Phygadeuon crassipes, Prov.—One ♀. Differs from description in colour of ovipositor.

? *Phygadeuon seminiger*, Hargtn.

Semiodes seminiger, Hargtn.—Type ♂ in my coll. Mr. Davis thinks this belongs to *Phygadeuonini*.

Phygadeuon nitidulus, Prov.—One ♀. The ♀ of this species was described from coll., Fletcher.

- Phygadeuon subspinosus, *Prov.*—Taylor; *loc. cit.* Not seen.
- Cryptus extrematis, *Cress.*—Ten ♂s sent to Mr. Fletcher are labelled as bred from Trichiosoma.
- Cryptus flavipes, *Hargtn.*—Type ♀ in my coll.
- Cryptus Fletcheri, *Prov.*—♀ described from coll., Taylor.
- Cryptus pentagonalis, *Prov.*—One ♂.
- Cryptus punicus, *Cress.*—Proc. Acad. Nat. Sci., Phil., 1878, p. 364.
- Cryptus persimilis, *Cress.*—One ♂.
- Cryptus proximus, *Cress.*—Three ♀s.
- Cryptus resolutus, *Cress.*—One ♂.
- Cryptus robustus, *Cress.*—Taylor (*loc. cit.*), "Not uncommon." Not seen, and probably *proximus*.
- Cryptus rufoannulatus, *Prov.*—Taylor, *loc. cit.* One ♀ received by Mr. Fletcher.
- Cryptus ultimus, *Cress.*—Two ♂s. Labelled as bred from Trichiosoma in April.
- Cryptus, n. sp.?—One ♀ near *vancouverensis*.
- Cryptus vancouverensis, *Hargtn.*—Three types ♀ in my coll.
- Cryptus victoriaensis, *Hargtn.*—Two types ♀ in my coll. One ♀ also received by Mr. Fletcher.
- Chæretymma Ashmeadii, *Hargtn.*—Type ♀ in my coll. One ♀ also received by Mr. Fletcher. This has annulate antennæ; the antennæ of type were missing.
- Orthopelma occidentale, *Ashm.*—One ♀.
- Hemiteles crassus, *Prov.*—Taylor, *loc. cit.* Not seen.
- Hemiteles militææ, *Ashm.*—One ♀.
- Hemiteles occidentalis, *Hargtn.*—Type ♀ in my coll.
- Hemiteles piceiventris, *Hargtn.*—Type ♀ in my coll.
- Hemiteles scolyti, *Ashm.*—One ♀.
- Ophion bilineatum, *Say.*—Eighteen specimens. These vary in size and colour, but apparently all belong to one species.
- Ophion nigrovarium, *Prov.* (?)—Taylor (*loc. cit.*) notes that the single insect so determined for him was destroyed.
- Anomalon Edwardsii, *Cress.*—♀ described from V. I. coll., H. Edw.
- Anomalon nigrum, *Prov.*—Taylor (*loc. cit.*): "Several bred from pupæ of Noctuæ." Not seen.
- Campoplex laticinctus, *Cress.*—One ♀.
- Campoplex major, *Cress.*—♀ described from V. I. coll., H. Edw.

Limneria argentifrons, Cress.?—One specimen, without abdomen, labelled *flaviricta*, but cannot be that species.

Limneria compacta, Prov.—♀ described from coll., Taylor.

Limneria dubitata, Cress.—One ♀.

Limneria fugitiva, Say.—One ♀.

Limneria major, Cress.—One ♀. This is labelled *L. genuina*, Say, but there does not seem to be any species described under that name, although Provancher also quotes it in his work.

Limneria valida, Cress.—One ♀.

Angitia americana, Hargtn.—Type ♀ in my coll.

Pyracmon vancouverensis, Hargtn.—Type ♀ in my coll.

Banchus superbus, Cress.

Banchus polychromus, Prov.—Two ♀s. Provancher's type not seen, but it seems undoubtedly, from description, to be a somewhat immature example (in which the black is not fully developed) of this well-marked yellow and black species.

Mesoleptus fasciatus, Prov.—♀ described from coll., Taylor.

Phobetres canadensis, Hargtn.—Type ♀ in my coll.

Mesoleius latus, Cress.—♂ described from V. I. coll., H. Edw.

Mesoleius truncatus, Prov.

Mesochorus truncatus, Prov.—♀ described from coll., Taylor.

Tryphon communis, Cress.—Two ♂s.

Syrphoctonus agilis, Cress. (*Bassus*).—Three ♀s.

Syrphoctonus pacificus, Cress. (*Bassus*).—♂ described from V. I. coll., H. Edw.

Coleocentrus occidentalis, Cress.—♀ described from same coll.

Rhyssa persuasoria, Linn.—One ♂.

Ephialtes pacificus, Hargtn.—Three types ♀ and one ♂ in my coll. The male is a very small specimen.

Ephialtes thoracicus, Cress.—♀ described from V. I. coll., H. Edw.

Ephialtes tuberculatus, Fourc.—Two ♀s.

Ephialtes vancouverensis, Hargtn.—Type ♀ in my coll.

Theronia fulvescens, Cress.—Fourteen ♀ and four ♂ specimens. A common insect, infesting *Clisiocampa*, *Orgyia*, *Menapia*, etc.

- Pimpla atrocoxalis*, Cress.—One ♀. From Clisiocampa.
- Pimpla conquisitor*, Say.—Two ♀s.
- Pimpla ellopiae*, Hargtn.—Types ♂ ♀ in my coll. Bred by Fletcher from pupæ of *Ellopia somniaria*, a moth of which the larvæ are most destructive to the foliage of oaks.
- Pimpla inquisitor*, Say.—Four ♀s. Apparently the *P. indigatrix* of list published by Taylor.
- Pimpla pedalis*, Cress.—One ♀.
- Pimpla sanguinipes*, Cress.—Four ♀s.
- Pimpla tenuicornis*, Cress.—One ♀.
- Polysphincta texana*, Cress.—Two ♀s.
- Glypta erratica*, Cress.—One ♀.
- Arenetra pallipes*, Hargtn.—Five types ♂ in my coll. Common at Victoria in March, April and May. Four ♀s received by Mr. Fletcher.
- Cylloceria occidentalis*, Cress.—Two ♂s.
- Lampronota Edwardsii*, Cress.—One ♀. This was labelled *Coleocentrus rufus*, Prov., and was entered under that name in Taylor's list. The species was described from ♀ in V. I. coll., H. Edw.
- Lampronota pleuralis*, Cress.—One ♀.
- Lampronota segnis*, Cress.—♀ described from V. I. coll., H. Edw.
- Lampronota vivida*, Cress.—♂ described from same coll.
- Xorides occidentalis*, Cress.—♀ described from same coll.
- Euxorides vancouverensis*, Prov.—The type ♀ was from Taylor's collection. Not seen.
- Xylonomus insularis*, Cress.—♀ described from V. I. coll., H. Edw.
- Aplomerus tibialis*, Prov.
- Platysoma tibialis*, Prov.—One ♀ labelled as found under loose bark. The type ♀ was also collected by Taylor.
- Ecthrus abdominalis*, Cress.—One ♀. Specimen also in coll. Geological Survey.
- Ecthrus* (?) *maurus*, Cress.—♀ described from V. I. coll., H. Edw.

BRACONIDÆ.

Bracon atripectus, *Ashm.*—Three ♀ and one ♂ specimens. The latter was labelled as type of *Bracon bisignatus*, *Prov.*, but no description appears to have been published.

Bracon sanguineus, *Ashm.*—Two, ♀ ♂.

Doryctes pacificus, *Prov.*

Phylax pacificus, *Prov.*, *CAN. ENT.*, Vol. XVII., p. 117, ♀; *Phylax niger*, *Prov.*, *ibid.*, ♂.—Five ♀ and one ♂ specimen, which are considered by Ashmead to belong to the same species.

Microdus sanctus, *Say.*—One ♀.

Helcon frigidus, *Cress.*—One ♀.

Macrocentrus mellipes, *Prov.*—One ♀.

CHALCIDIDÆ.

Diomorus (?) *Zabriskii*, *Cress.*—One ♀.

Meraporus sp.—Six specimens.

PROCTOTRYPIDÆ.

Mesitius vancouverensis, *Ashm.*—♀ described from coll., Taylor.

Anteon puncticeps, *Ashm.*—♂ described from V. I. coll., Wickham.

Polymecus vancouverensis, *Ashm.*—♀ described from coll., Taylor.

TRIGONALIDÆ.

Trigonalys canadensis, *Hargtn.*—Type ♂ in my coll.

A NEW SPECIES OF PROTANDRENA, CKLL.

BY S. N. DUNNING, HARTFORD, CONN.

Protandrena Cockerelli, n. sp.—♀. Length, 12 mm.; shining black. Upper half of clypeus, lower portion of supraclypeal area, and part of side pieces, bright yellow, all forming a band across the face one-half broader than high, and of equal breadth throughout; knees yellow spotted. Head rounded, broader than high, and covered with a short growth of gray hair, longer on cheeks and thickest at base of antennæ; lower half of clypeus and two small dots near lower edge of band black, not deeply or closely punctured; antennæ black at base, becoming brown towards

the tip ; first joint of flagellum not quite as long as the second and third combined ; mandibles black ; vertex deeply but not very closely punctate. Thorax covered with gray hair, quite thick below and anteriorly ; mesothorax before deeply and a little more thickly punctured than vertex anteriorly, and the scutellum more largely but less closely punctate ; postscutellum similar to anterior mesothorax, while the metathorax is quite finely and closely punctate ; below the wings the thorax is closely and roughly punctured ; tegulæ and nervures rufous, the stigma with a light spot before ; wings hyaline, much clouded at tip, marginal cell truncate and strongly appendiculate. Abdomen with white basal hair bands ; first segment deeply but not thickly punctured ; second, third, and fourth not as deeply and more closely punctate ; fifth more deeply and quite roughly punctate, and with a heavy rufous hair band posteriorly ; abdomen below with long and not distinctly separated hair bands, more finely punctate than above. Legs hairy, all except first joint of anterior, and the last joint of the middle tarsi rufous ; hind tarsi black ; anterior spur one-half as long as first joint tarsi, middle spur two-thirds as long as first joint of middle tarsi, and lateral spurs shortest of all, rufous ; claws cleft with several teeth inside.

Described from one ♀ taken at Topeka, Kansas, in 1864, by Mr. J. E. Taylor, and numbered 1,043 in my collection. Prof. T. D. A. Cockerell (after whom I have named this species, as a slight token of respect and of my gratitude for his many favours) pronounces this to be a valid new species. I would adopt his table (as published on p. 92 of the *Annals and Mag. Nat. Hist.*, July, 1896) as follows :

A. Large species.

(1) Stigma ferruginous.

(a) Hairy, tegulæ rufous, knees yellow *Cockerelli*, Dun.

(b) Not so hairy, tegulæ yellow spotted, 4 anterior knees yellow *mexicanorum*, Ckll.

(2) Stigma dark *asclepiadis*, Ckll.

B. Small species.

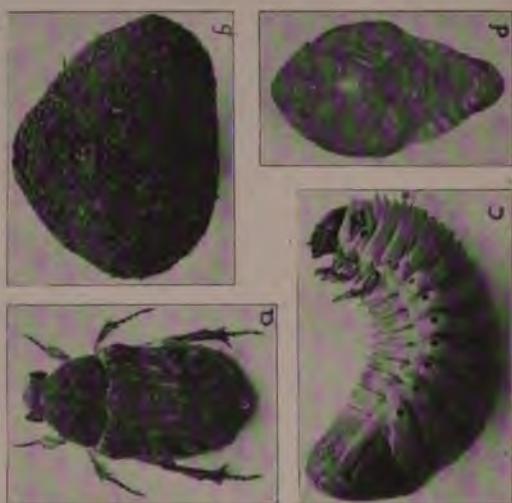
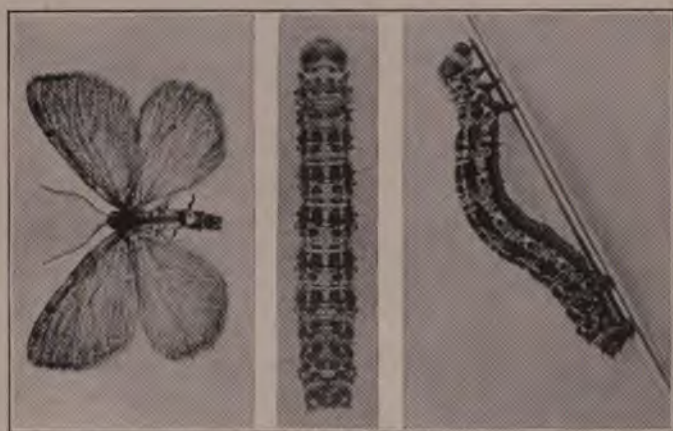
(1) Tarsi piceous in ♀.

(a) Postscutellum and metathorax brownish . . . *maurula*, Ckll.

(b) Postscutellum and metathorax black *trifoliata*, Ckll.

(2) Tarsi rufous in ♀, yellowish-white in ♂ *heteromorpha*, Ck'l





THE BLUEBERRY SPAN-WORM (*Dastocis inceptaria*) and THE BUMBLE
FLOWER-BEETLE (*Euphoria inda*).

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THE BLUEBERRY SPAN-WORM (*DIASCTIS INCEPTARIA*, WALK.) AND THE BUMBLE FLOWER-BEETLE (*EUPHORIA INDA*, LINN.).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

On May 20th, 1896, I received the following letter from a correspondent in Mount Vernon, N. H.: "I enclose you worms that are making sad havoc with the blueberry crop in this section. They seem to be great feeders, completely stripping the bushes of leaves and blossoms, but do not touch the green berries after they begin to form. The berry fields look as though a fire had passed over them, and the worms have nearly ruined the blueberry crop in this vicinity.

"This blueberry (*Vaccinium pennsylvanicum*) needs no cultivation, only to burn over the old bushes every few years, when the new bushes will shoot up and bear the following year. There are hundreds of acres of land producing these berries in this and neighbouring towns, and so far as I can learn, about three-fifths of the crop has been destroyed by the worms."

Accompanying the letter were four nearly full-grown span-worms and one pupa. The larvæ were new to me, and their ravages described above also made them interesting from an economic standpoint. One was therefore photographed, about three times natural size; both dorsal and lateral views of it are shown on the plate. When full-grown the larvæ measure about five-eighths of an inch in length and are peculiarly marked, as the figures show. The general colour of the body is light yellowish-purple. The dark portions are of a dead black colour. The sutures of the head are broadly margined with white, and a broad white band crosses the sides of the head. The mesal stripe on the dorsum is light yellow, as is also the narrow stripe extending along the subdorsal region through the large black areas. The broad stigmatal stripe is light orange-yellow, whitish below each large black area. Spiracles black. The large black subdorsal areas are in a broad-light purplish stripe. The body is sparsely

clothed with black hairs. The true legs are black, with yellow bands at the extremities of the joints. Venter yellowish, tinged with purple.

On May 22nd, one of the larvæ changed to a pupa on the soil in my cage. The worms would not eat the currant leaves placed in the cage. The pupa is of a very dark, shining brown colour, with the abdomen a little lighter and sparsely punctate.

As the other pupa and the larvæ had all died, the pupa just described was watched with much interest daily. At last, on the twelfth day (June 4), a dainty, modest little Quaker-gray moth emerged. It is shown, twice natural size, on the plate. About the only noticeable markings on the wings are one or two blackish spots on the costa of each front wing. The antennæ are quite strongly pectinated. The moth was at once sent to Mr. Hulst, who determined it as *Diastictis inceptaria*, Walk. In an illustrated communication to the "Rural New-Yorker" for July 25, 1896, I proposed that the insect be popularly known as the "Blueberry Span-worm," in recognition of its destructive work on that plant.

The moth was first described in 1862 (Cat. Brit. Mus., XXVI., 1667), from a Canadian specimen in the D'Urban collection. Dr. Packard again described it as *argillacearia* in 1874; this name was found to be synonymous with Walker's earlier name, *inceptaria*, by Mr. Moffat, as recorded by Mr. Hulst (Ent. News, VI., p. 11, 1895). Dr. Packard records the moth from Maine, Massachusetts, Pennsylvania, and Canada (Mon. of Geom., p. 258). He states that "it is very abundant in pine woods in Maine on a dry soil, rising and fluttering with rather a feeble flight, and soon settling again. In July, 1874, I captured thirty males before securing a female; the latter are apparently less ready to fly."

Heretofore nothing seems to have been known of the early stages of this Geometrid. Whether there is more than one brood of the caterpillars is not known. Doubtless the practice of burning over the blueberry fields every few years greatly checks the pest. The larvæ will probably quickly succumb to a Paris green spray, and a little united effort among those interested would soon control this blueberry span-worm.

THE BUMBLE FLOWER-BEETLE (*Euphoria inda*, Linn.).

This yellowish-brown beetle, with its wing-covers sprinkled all over with small, irregular black spots (shown at *a* on the plate, twice natural size), is our most common flower-beetle in the North. "It is one of the first insects to appear in the spring. It flies near the surface of the ground,

with a loud, humming sound, like that of a bumble-bee, for which it is often mistaken. During the summer months it is not seen, but a new brood appears about the middle of September. The beetle is a general feeder, occurring upon flowers, eating the pollen; upon cornstalks and green corn in the milk, sucking the juices; and upon peaches, grapes, and apples. Occasionally the ravages are very serious." (Comstock's Manual for the Study of Insects, p. 565.)

Although this beetle is so common, and has been known for more than a hundred years, nothing was recorded of its earlier stages (beyond the fact that it occurred in its various stages in the nests of ants) until December, 1894. Then Mr. Chittenden (Insect Life, VII., 272) recorded the rearing of the beetle from larvæ found in manure on Long Island. When found, July 9th, the larvæ were encased in cocoons, and the last week in August these cocoons contained living adults.

On June 19th and July 8th, 1896, I received a large number of grubs from Mt. Kisco, N. Y. They were found in a manure pile that had not been disturbed since the preceding August, and from the soil beneath another pile made in October and moved in the following April. One of these grubs is represented, twice natural size, at *c* on the plate. When compared with a white grub (*Lachnosterna*, sp.), it was found to be considerably shorter and thicker-set; its legs were not more than one-half as long, and its head was also much smaller than that of the white grub. The dull leaden hue of the body, due to the contents of the food-canal, indicated that its food consisted of dead vegetable matter rather than living roots, as in the case of the white grub. When they were placed on their feet or venter, they would crawl an inch or so and then roll over and crawl with considerable rapidity, with a wave-like motion, on their backs. I also found several similar grubs in a pile of rotting sod and manure which had not been disturbed for a long time. I have seen no evidence of their eating the roots of living plants.

The grubs were placed in cages containing rotting sod and manure, in which they quickly buried themselves. Twenty days later, July 28th, the grubs had changed to pupæ in earthen cocoons of the somewhat peculiar and definite shape shown, twice natural size, at *b* on the plate. Evidently the grub forms an earthen cell in the soil by rolling and twisting about, and then cements together the particles of earth composing the walls of the cell so as to form an earthen cocoon, which retains its form

when removed from the soil. Each cocoon has a curious roughened or more granular spot on one side (the upper side in the figure).

The white pupa is shown, twice natural size, at *d* on the plate. In pupating, the larval skin is shed off the anal end in the same manner as caterpillars do. In the case of the Spotted Pelidnota (*Pelidnota punctata*), however, the larval skin splits down the whole length of the back, retains the larval shape, and forms a covering for the pupa, which remains inside.

On August 13th, or sixteen days after pupæ were found in the cages, several beetles emerged. They continued to appear daily until September 10th; more (33) emerged on August 22nd than on any other day. They proved to be *Euphoria inda*, Linn.

This bumble flower-beetle evidently feeds only on decaying vegetable matter, as rotting sod or manure, and is thus destructive only in the beetle state. The beetles seem to do most of their injury soon after they emerge in the early fall. One correspondent wrote me that he collected forty-five of the beetles in one day on a single ripe peach. Doubtless the beetles hibernate, but whether egg-laying takes place in the fall or spring is not known. The fact that manure piled in August and October contained many nearly full-grown grubs the next June indicates that the eggs are laid and hatched in the fall, otherwise the grubs must develop very rapidly after hatching from eggs laid in the spring. There seems to be one brood of the insect in the course of a year. Hand-picking of the beetles is apparently the most practicable method of combating it when it is found working on ripe fruits or on green corn.

Since the above was written, some further notes on this insect (read by Dr. Lintner at the Buffalo meeting of A. E. C. last August) have been published. Larvæ were sent to Dr. Lintner in chip manure in the latter part of June. On August 8th two beetles had emerged in his cage, and an examination of the earthen cells revealed other beetles and several pupæ. An instance is given which seems to indicate that there is a possibility that the grubs may have attacked growing corn, but the evidence is not conclusive.

BUTTERFLIES OF NORTH AMERICA.—Mr. Edwards is about to publish the last Part, the seventeenth, of the third volume of this magnificent work. It will contain three plates, illustrating *Chionobas Iduna*, California, *Oeno*, Varuna and Alberta, with their early stages, and the imago of *C. Peartia*. There will also be accounts of *Papilio Brucei* and *Ajax*, *Neophasia Menapia*, and *Colias Eriphyle*; and supplementary notes on a large number of other species, with title page and index.

DESCRIPTIONS OF SOME NEW GENERA AND SPECIES OF
CANADIAN PROCTOTRYPIDÆ.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

The following new genera and species of Proctotrypidæ were all collected in Canada by Mr. W. Hague Harrington, of Ottawa.

SCORPIOTELEIA, gen. nov.

Abdomen with five visible segments; the last three segments long, slender, cylindrical, together as long as the second, and resembling the terminal segments of a scorpion; the third segment is about as long as the fourth and fifth segments united, the fifth pointed. Front wings with the marginal vein shorter than the marginal cell, and scarcely twice as long as the first abscissa of radius, which is slightly oblique. Antennæ 15-jointed, filiform, the first joint of flagellum the longest, about half the length of the scape, the following joints to the last very gradually shortening, the penultimate joint being about twice as long as thick, the last joint oblong-oval, one-half longer than the preceding.

(1) *Scorpioteleia mirabilis*, sp. n.

♀.—Length, 4 mm. Smooth, shining, pubescent; head and thorax black, collar and prosternum brownish; petiole and the large second abdominal segment brownish-piceous, the three terminal segments yellowish; mandibles, legs and basal four joints of antennæ ferruginous, the flagellum blackish towards apex; palpi yellowish.

The mesonotal furrows are deep, distinct; the scutellum has a large, deep fovea across the base; while the metanotum is smooth, tricarinate, with the posterior angles subdentate. Wings hyaline, pubescent, the tegulæ yellowish, the veins broad. Abdominal petiole longer than the metathorax, a little thicker towards base than at apex, striated, about three times as long as thick, rest of abdomen smooth, polished.

Hab.—Kettle Island, in Ottawa River, August 18, 1894.

STYLIDOLON, gen. nov.

Abdomen with six visible segments, the body of same being long and very slender, twice as long as the petiole, and gradually acuminate toward apex, which has a gentle upward curve; the second segment is scarcely longer than the petiole, the dorsum of same triangularly emarginated at apex; the third segment dorsally, on account of the emargination in the second, a little longer than the fourth and fifth, but ventrally it is not longer than these two segments united; the fifth is shorter than the fourth; the sixth is conically pointed, a little longer than the third. Front

wings with the marginal vein as long as the marginal cell, or about $2\frac{1}{2}$ times as long as the oblique first abscissa of radius. Antennæ 15-jointed, filiform, the first joint of flagellum about two-thirds the length of the scape, the following joints to the sixth gradually shortening; joints 7 to 11 much shorter, subequal, about twice as long as thick; the 12th very little longer than thick, the last joint thicker, ovate, nearly as long as the two preceding united.

(2) *Stylidolon politum*, sp. n.

♀.—Length, 3.5 mm. Polished black, shining, pubescent; tegulæ, scape and pedicel ferruginous, the flagellum black or brown-black. Wings hyaline, the veins dark brown. Legs rufous, the articulations paler or yellowish, the hind coxæ black or piceous black.

Hab.—Ottawa, May 13, 1896.

MIOTA, Förster.

(3) *Miota rufopleuralis*, sp. n.

♀.—Length, 2 mm. Polished, shining, pubescent; head black; dorsum of thorax and body of abdomen, except the tip, brown-black or piceous; mandibles, collar, sides of thorax and beneath, rufous; palpi, scape, pedicel, legs and petiole of abdomen, yellowish.

The antennæ are shorter than the body, the flagellum being brown-black; scape as long as flagellar joints 1 to 4 united, the first flagellar joint the longest, not more than thrice as long as thick, the joints beyond very gradually shortening, the three or four penultimate joints only a little longer than thick, the terminal joint conical, only a little longer than the preceding joint. Wings hyaline, the tegulæ yellowish, the veins brownish, the marginal vein very short, only a little longer than the first branch of the radius, or scarcely one-third the length of the radial cell.

Hab.—Hull, P. Q., August 14, 1894.

(4) *Miota Canadensis*, sp. n.

♀.—Length, 2.5 mm. Polished black; first three joints of antennæ, the tegulæ and legs brownish-yellow; palpi white.

The antennæ are not quite as long as the body; scape as long as flagellar joints 1 to 3 united, the first flagellar joint the longest, more than four times as long as thick; flagellar joints 7 to 12 hardly longer than thick. Wings hyaline, the veins brownish-yellow, the marginal vein about three times as long as the first abscissa of radius, or as long as the marginal cell.

Hab.—King's Mountain, Chelsea, P. Q., August 12, 1894.

ZELOTYPÆ, Förster.

(5) *Zelotypa fuscicornis*, sp. n.

♂.—Length, 2.5 mm. Polished black, pubescent; antennæ longer than the body, fuscous, the scape hardly as long as the pedicel and first joint of flagellum united, the latter excised at basal one-half. The flagellar joints 2 to 11 subequal, about four times as long as thick; legs brownish-yellow, the hind coxæ black. Wings hyaline, the veins brown, the marginal vein hardly two-thirds the length of the marginal cell, or about one and a half times as long as the first abscissa of the radius. Petiole of abdomen rather stout, about two and a half times as long as thick, coarsely fluted.

Hab.—Hull, P. Q., July 23.

PANTOCLIS, Förster.

(6) *Pantoclis Canadensis*, sp. n.

♀.—Length, 2 mm. Polished black, pubescent, the body of abdomen more or less brownish piceous; antennæ, except the 7 or 8 terminal joints, and legs, brownish-yellow.

The scape is about as long as the first six joints of the flagellum united, the first joint of flagellum being a little longer and more slender than the pedicel, or about twice the length of the second joint; all joints of the flagellum, except the last, are submoniform and gradually become thicker and broader, the six penultimate joints being a little wider than long, subpedunculate; the last joint is conical, a little longer than the preceding. Wings subhyaline, the veins dark brown, the radial cell rather small, triangular, a little longer than the oblique first abscissa of radius. Petiole of abdomen scarcely twice as long as thick, opaque, coarsely fluted.

Hab.—Ottawa, August 13, 1894.

(7) *Pantoclis similis*, sp. n.

♂.—Length, 2.6 mm. Polished black, pubescent; two basal joints of antennæ, the palpi, the tegulæ and the legs, including all coxæ, brownish-yellow.

The antennæ are shorter than the body, the scape being about as long as the pedicel and first joint of flagellum united; flagellum brown-black, the first joint the longest, not quite five times as long as thick, with the basal one-third strongly excised, the following subequal, but very gradually shortening, so that the three terminal joints are scarcely two and a half times as long as thick. Wings hyaline, the veins brownish,

the marginal vein about two-thirds the length of the marginal cell, or one-half longer than the oblique first abscissa of radius. Petiole of abdomen stout, two and a half times as long as thick, fluted.

Hab.—Russell's Grove, Hull, P. Q., August 5, 1894.

A NEW WATER-BUG FROM CANADA.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

The interesting new species of water-bug described below was received some time ago from Abbé P. A. Bégin, of Sherbrooke, Canada. It was captured swimming on a fresh-water stream some little distance above Sherbrooke, and is of more than ordinary interest, from the fact that it belongs to the genus *Halobatopsis*, Bianchi*, a genus not yet recognized in the North American fauna, and only recently characterized, being based upon the South American *Halobates platensis*, Berg., also a fresh-water species.

Halobatopsis Béginii, n. sp.

♀.—Length, 2.3 to 2.5 mm. Oval, velvety black; a yellow dot or spot on middle of pronotum anteriorly, a larger, somewhat triangular, yellow spot, but more or less variable in shape and size, on the upper basal hind angle of the mesopleura close to the base of the metapleura, while beneath, the mesosternum anteriorly and posteriorly and along the median furrow or suture is more or less broadly margined with yellow. Antennæ scarcely two-thirds the length of body; the first joint subclavate, slightly curved, shorter than the three following joints united, but distinctly longer than joints 2 and 3 combined; joints 2 and 4 subequal, longer than the third, the latter being about three-fourths the length of the second; the fourth or last joint is fusiform. The legs in all my specimens are broken, but are similar to those found in *Trepobates*, Uhler (= *Stephania*, White), the middle legs being much the longest pair. The anterior legs are very short, shorter than the body; the femora, with their trochanters, being about as long as the tibiæ and tarsi combined; the tarsi, consisting of only a single joint, being a little longer than half the length of tibiæ; middle legs very long, their femora alone being as long or even longer than the body, the tibiæ being fully one and a half times as long as the femora, the tarsi about half the length of tibiæ. The hind legs in all my specimens are broken, but the femora, which alone remain, are much slenderer and considerably longer than those of the middle pair.

Hab.—Sherbrooke, P. Q., Canada. Dedicated to Abbé P. A. Bégin, the discoverer of the species and a most valued correspondent.

*Ann. Musée Zool. l'Acad. Imp. des Sci. de St. Petersburg. 1896, p. 70.

MAMESTRA CIRCUMCINCTA, SMITH.

BY JOHN B. SMITH, SC. D., NEW BRUNSWICK, N. J.

The above species was described by me in the Proceedings of the U. S. National Museum, Vol. XIV., page 253, in my revision of the genus *Mamestra*. Recently Mr. Grote has questioned the distinctness of this species from *olivacea*. I could hardly credit this as being serious, and barely referred to the matter in the September, 1896, number of the CANADIAN ENTOMOLOGIST, page 240. In the December number, page 301, Mr. Grote returns to this subject, and again suggests that *circumcincta* may be either *olivacea* or *comis*. He refers to the fact that the description resembles that of both the species cited by him, and brings in Mr. Beutenmüller to testify to the fact that my species closely resembles *olivacea*. Mr. Beutenmüller is not a specialist in the Noctuidæ, and not entitled to an opinion that would carry decisive weight. Furthermore, it was not fair to Mr. Beutenmüller to ask him to make the comparison without first referring him to my description. Mr. Grote speaks as if the statement that *circumcincta*, or its description rather — for he has never seen the species — resembles *olivacea* was an important one and a discovery of his own. He does not refer to the fact that in my description I say: "the male resembling *olivacea* so strongly that I compared it closely at first, expecting a variety of this protean form." It seems to me it would be impossible to state more definitely the fact that I recognized the very close resemblance, superficially, between the species newly described by me and the very variable one long ago characterized. Mr. Grote also omits entirely the fact that the last sentence in the description and my comment on it reads: "The sexual characters, however, refer the species to the *renigera* group." On plate X., accompanying my paper, I delineate the sexual structures of *circumcincta* at figure 52, and of *olivacea* at figure 53. The two are so utterly different that it is simply impossible that one type should be a modification of the other. My species is, therefore, based upon a structural character primarily, and after that upon colour and markings. Now, if Mr. Grote will claim that these structural characters are not of specific value, then the question of whether my species may be *olivacea* is open for discussion. Until he takes this stand, these two species cannot be compared for a moment whatever their superficial similarity may be. I have asserted time and again that differences in sexual structure invariably indicate differences in species. Many other Entomologists have taken the same stand. Mr.

Grote has not, so far as I know, taken any stand in the matter, except so far as to deny the value of these characters for generic separation. If he is willing to assert that these structures have no specific value, then the question is an open one; but I submit that to bring the matter before the readers of the CANADIAN ENTOMOLOGIST, as if there was a mere matter of colour and marking to be considered, is neither scientific nor honest. Before suggesting the identity of the two species he should have referred to the fact that I recognized their superficial resemblance, and separated them upon a distinct structural character.

One other point in Mr. Grote's paper is worth noting. In the matter of *Agrotis crassa*, Mr. Grote excuses his failure to recognize the true character of the frontal structure by stating that neither he nor the Museum with which he is connected possesses a microscope. He does not distinctly say so, but it would seem as if neither did they possess an ordinary hand lens of from $\frac{1}{2}$ to $\frac{3}{4}$ inch focal length, which is all that is necessary to recognize external structures of Noctuid moths serving for the division of genera. If not even the simplest and most necessary appliances for study are at hand, is any man justified in making assertions on points concerning which he cannot have any possible certainty? But even without the optical assistance to which I have referred, surely either Mr. Grote or the Institution at Hildesheim has in its possession a little camel's-hair brush, and with this, or even the frayed end of an ordinary wooden toothpick, the scales from the front can be sufficiently removed to enable one to recognize the frontal structure with the unassisted eye. One who makes assertions as to structure, should at least take every means within his power to make certain that they are accurate. Mr. Grote evidently has not done this, and in every assertion that he has made, concerning the identity of genera in this *Feltia* matter, I have proved him wrong. To escape from the necessity of considering his genus *Carneades* a synonym of *Agronoma*, he seems now to be willing to recognize the distinctness of the division that I have called *Porosagrotis*, basing it, however, upon the fact that the antennæ in the typical species are pectinated. This he considers a good generic character, differing in that point from all the authors who have written on this genus. Unfortunately, the genus *Carneades* contains species with antennæ pectinated and antennæ serrated, and so also does the genus that I have called *Porosagrotis*. There is no line of distinct demarcation between these two types of antennal structure, so that I could not utilize them even for

divisions within the genus. The ordinary type of antenna in *Carneades* is what Mr. Grote has called brush-like, and consists of joints with more or less marked lateral projections, bearing on all sides stiff, bristly hair. It is the form that is called "bristle-tufted" by other authors. The lateral projections vary in size in the species, and when they become evident to the naked eye the antenna is called pectinated. The pectinations may be long or short, and the distinction between a shortly-pectinated antenna and one that is merely "brush-like" is entirely a matter for the individual judgment of the author who uses the term, as the two forms grade into one another imperceptibly. Mr. Grote cannot escape either admitting that the sexual character that I have made use of to separate *Porosagrotis* is a good one for the generic purposes or admitting that *Agronoma* must supercede *Carneades*. It does not make any difference to me which he chooses, because it does not distress me, as Mr. Grote says it does him, to have any name proposed by me relegated into the synonym, whenever there is scientific cause for it set forth by one whose methods of work and accuracy of research entitle him to the confidence of those for whom he writes.

MONODONTOMERUS IN APPALACHIA.

BY W. H. PATTON, HARTFORD, CONN.

MONODONTOMERUS STIGMA (Fabr.).

M. viridancus, Prov., Canada.

Common in New England. In the District of Columbia I have reared it from the cell of *Melitoma euglossoides*, var. *taurea*, Say.

The genus *Oligosthenus* cannot remain separated, the fine dentitions of hind femora being more or less indistinct.

A frequent variety has no cloud about stigma. The abdomen varies in the amount of purple.

A male taken by me at Hartford, Conn., Aug., 1895, differs decidedly from the male of *M. montivagus*, Ashm., described by Mr. Cockerell in the CAN. ENT., XXVIII, 127, May, 1896. My male measures 3 mm. in length. It has no cloud about stigma; the abdomen is purple, except apex and most of the first segment. The scape is slender, as in the female; the flagellum is as in the female. Hind coxæ and femora much more swollen than in the female, tooth longer, no denticulations. The abdomen is short, broad; dorsum flat, shining. The descriptions of the females do not differ specifically.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXI. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC — (*Concluded*).

Tribe X.—HISPINI.

The form alone of these little beetles is amply sufficient for their separation from the other tribes of Chrysomelidæ. They are more or less wedge-shaped, the elytra often broadly and squarely truncate behind and with rows of deep punctures, sometimes costate as well. Only two of the North America genera have been recorded from our territory, *Microrhopala*, with 8-jointed antennæ (owing to the fact that the last four joints are closely connate), and *Odontota*, in which the antennæ are 11-jointed. The middle tibiæ are straight in both of these genera.

MICRORHOPALA, Chev.

A. Elytra with only eight series of punctures.

- b. Head usually red, thorax red, elytra blue-black with side margin and discal vitta red. .21-.25 in. *vittata*, Fabr.

bb. Head, thorax and elytra unicolorous (bluish, greenish or bronzed).

- Punctures of the outer rows of elytra larger than inner. .20 in. *excavata*, Newm.

- Punctures of outer rows like those of the inner. .22-.25 in. *cyanea*, Say.

AA. Elytra with more than eight series of punctures on a part of their length, the fourth interval bearing four rows near the apex.

- Form more elongate. .12 in. *porcata*, Mels.

ODONTOTA, Chev.

A. Elytral punctures in ten rows; more or less distinctly costate.

Elytra reddish or yellowish, with black sutural stripe.

- .24-.26 in (fig. 10) *dorsalis*, Thunb.

Elytra blackish, humeri sometimes reddish.

- Body beneath black, thorax in part and humeri of elytra red. .22-.28 in. *scapularis*, Oliv.

- Body beneath and thorax red, elytra black. .24 in. *bicolor*, Oliv.



FIG. 10.

Elytra rosy or reddish yellowish, much broader at apex, and with serrate, explanate margin, the disc indistinctly marked with

- dark spaces. Under surface variable in colour, thorax coloured like the elytra. .24-.26 in. *rubra*, Web.
- AA. Elytral punctures in eight rows, costæ acute. Colour variable, usually with head dark, thorax and elytra pale with dark spots of irregular shape. .15 in. *nervosa*, Panz.

Tribe XI.—CASSIDINI.

These are the "tortoise beetles" or "helmet beetles" found on morning glories and other convolvulacæ. They are easily recognized on account of the peculiar form, which is circular or elliptical in outline, the upper surface convex, the margins of elytra and thorax explanate (to a varying degree), the head concealed. Some of them, notable *Coptocycla aurichalcea*, which, with its larva, is often abundant on the morning glory, are of most brilliant golden and greenish tints when alive; these, however, being lost at or after death. The three genera found in Canada are as follows:

Size large (.38-.46 in.), form more elliptical.

Head partially exposed, thorax and elytra spotted. . *Chelymorpha*.

Head entirely covered, thorax spotted, elytra plain. . . . *Physonota*.

Size small (.20-.30 in.), head entirely covered, antennæ longer than thorax. *Coptocycla*.

COPTOCYCLA, Chev.

Three species are recorded, one of which, *C. clavata*, Fabr., is easily known by its size (.30 in.), the brown elytra, which are roughened and gibbous, and the transparent spot on the middle of the outer margin. It occurs on the "ground cherry." The others have the elytra nearly even without gibbosities, and are closely allied. Mr. Crotch separates them by the fact that in *aurichalcea*, Fabr., the body beneath and the last four joints of the antennæ are black, while in *guttata*, Oliv., the sides of the body beneath are reddish and the last two joints of the antennæ are black. Both are of about the same size, a trifle under a quarter of an inch in length.

PHYSONOTA, Boh.

A rather large insect of a greenish or pale yellow colour, the thorax spotted, the principal and most constant spot being a large one near the middle. Two others are usually present near the base. Elytra not maculate. It is described by Say as *P. unipunctata*.

CHELYMORPHA, Chevr.

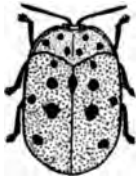


FIG. 11.

Represented by *C. argus*, Licht., of the size of the preceding species (.36-.48 in.), yellowish or reddish above, black beneath. Thorax with four black spots in a curved transverse row, behind which are often two others. Elytra usually with six black spots on each, arranged as shown in Fig. 11, and a common spot just posterior to the scutellum. Legs usually black. The prosternum is rather deeply longitudinally grooved and produced in front.

The following bibliography gives the names of the principal papers on the North American Chrysomelidæ; a few short articles have been omitted to economize space, since the genera have been treated in the more extended papers cited.

- 1845-1848.—Lacordaire, Th. Monographie des Coléoptères subpentamères de la famille des Phytophages. 2 Vols. Mem. Soc. Roy. Liege, Vols. III. and V.
- 1849.—Haldeman, S. S. Cryptocephalinorum Borealis Americæ diagnosis. Jour. Acad. Nat. Sci., N. S., I.; Proc. Acad. Nat. Sci., IV.
- 1852-1854.—Suffrian, F. Monographie und kritisches Verzeichniss der Nordamerikanischen Cryptocephaliden. Linnæa Entom., VI. and VII.
- 1856.—Rogers, W. F. Synopsis of the species of Chrysomela and allied genera inhabiting the United States. Proc. Acad. Nat. Sci., VIII.
- 1862-1865.—Stål, C. Monographie des Chrysomelides de l'Amérique. Upsal.
- 1865.—Leconte, J. L. On the species of Galeruca and allied genera inhabiting North America. Proc. Acad. Nat. Sci., Philadelphia.
- 1866.—Leconte, J. L. Practical Entom., II., p. 9 [Prasocuris].
- 1873.—Crotch, G. R. Material for the study of the Phytophaga of the United States. Proc. Acad. Nat. Sci., Philadelphia.
- 1880.—Leconte, J. L. Short studies of North American Coleoptera. Tr. Am. Ent. Soc., VIII. [Cryptocephalini].
- 1883.—Horn, Geo. H. Chrysomelidæ, Hispini. Miscellaneous notes and short studies of N. A. Coleoptera. Trans. Am. Ent. Soc., X.
- 1889.—Horn, Geo. H. A synopsis of the Halticini of Boreal America. Tr. Am. Ent. Soc., XVI.
- 1891.—Leng, Chas. W. Revision of the Donaciæ of Boreal America. Tr. Am. Ent. Soc., XVIII.

- 1892.—Horn, Geo. H. Studies in Chrysomelidæ. Tr. Am. Ent. Soc., XIX.
1892.—Horn, Geo. H. The Eumolpini of Boreal America. Tr. Am. Ent. Soc., XIX.
1893.—Horn, Geo. H. The Galerucini of Boreal America. Tr. Am. Ent. Soc., XX.
1896.—Linell, M. L. A short review of the Chrysomelas of North America. Jour. N. Y. Ent. Soc., IV.

Since the note on the genus *Zeugophora* was printed (on p. 73 of the previous volume) two other species have been received from Mr. R. J. Crew, of Toronto: *Z. Kirbyi*, Baly (*Reinecke*, Grote), which is uniformly yellowish above, and *Z. scutellaris*, Suffr., in which the head and thorax are entirely yellow, while the elytra are black, with large punctures, separated by more than their own diameters. Collectors should be on the lookout for *Z. consanguinea*, Cr., which differs from *scutellaris* in having the occiput black, while the elytral punctures are close. It is known to me from Wisconsin, Illinois, and Manitoba.

Attention should be called to a clerical error in the table of *Chrysomela*. The name *labyrinthica* should read *pnirsa*. Dr. Leconte is said to have distributed it under the manuscript name of *labyrinthica*, and in thinking of it by this characteristic cognomen the error was committed.

ON THE MEXICAN BEES OF THE GENUS AUGOCHLORA.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

In the Transactions of the American Entomological Society, XX., 147, after notes and descriptions of five species of *Augochlora*, I gave the following note: "All of the species of *Augochlora* mentioned above agree in having the hind spur serrate with numerous fine teeth, and form a distinct section of the genus. Another section, to which belong *A. lucidula*, Sm., *A. sumptuosa*, Sm., and *A. humeralis*, Ptn., is characterized by having this spur provided with four or five long teeth."

In the January number of this journal, XXIX., 4-6, Prof. Cockerell makes use of these distinctions—under more obscure terms, however—and has given special names to these sections, and that, too, without referring to my note. I have no objections to his giving names to the sections, however, for I have had ample opportunity to do so, if I had

desired. My note was intended for the use of students of these insects, and was given to call attention to the form of the hind spur, the importance of which was not indicated in the descriptions because all of these had the spur of the same form.

It is nothing new to me to hear that the males of *A. viridula* and *A. fervida* have the hind spurs different from the females. Indeed, I have never supposed that the spurs of the males of *Halictus* and *Augochlora* presented any important characters, though, as a rule, I have mentioned the form of the hind spurs in the descriptions of the females.

In Trans. Am. Ent. Soc., XXII., 118, I indicated *A. lucidula*, Sm., as a synonym of *A. viridula*, Sm. I intended to confirm Patton's view that the former was the female of the latter, and cited the place where he had expressed it. As regards the synonymy of *A. fervida*, Sm., and *A. humeralis*, Ptn., the description of the male of Patton's species is the only thing which leaves any doubt in my mind. I think they are the same, however. Two of my specimens have the tarsi pale testaceous, while a third has all except the basal joint dark, seeming to connect the typical *A. fervida* ♂ with the male described by Patton. I have no doubt at all about what I have identified as *A. humeralis* being the female of *A. fervida*, and that is all I have said about it.

The females of the first division do not have the spurs "ciliate or simple," but serrate with numerous fine teeth. The spurs are to be distinguished mainly by the number and length of the teeth, a fact which is obscured by the terms "ciliate" and "pectinate." The females of the second group have the spurs with only four or five long teeth.

It is one thing to use these characters in separating the species, and quite another to found named sections upon them before it is shown that they are valid indications of relationship throughout the genus. If we assume that *Augochlora* is a genus distinct from *Halictus*, or even a natural section of that genus, we must admit that the form of the hind spur is a case of parallel modification, and no proof of affinity. Otherwise, we must subdivide each genus and rearrange the species according to the form of the spur. In *Halictus*, I am satisfied that some species with few-toothed spurs are more closely related to species with finely serrate ones than to some species whose spurs are more like their own. Judging from analogy, we may expect to find the same thing in *Augochlora*.

NEW FORMS OF OSMIA FROM NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, N. M.

Osmia prunorum, n. sp.

♀.—Length, 9 mm.; shining dark greenish-blue, densely punctured with pale ochreous pubescence. Head subquadrate, face and front so densely punctured as to be cancellate; pubescence thin except on occiput; clypeus punctured just like the front, with no central keel, the anterior margin broadly dark purple, the edge straight and entire, two converging brushes of orange hair projecting from beneath it. Mandibles with the two lower teeth long and pointed. Antennæ rather short, flagellum only feebly brownish beneath. Thorax very closely punctured, not very densely hairy; basal triangle of metathorax minutely granular, its extreme base minutely longitudinally plicate. Tegulae black, shining, sparsely punctured. Wings hyaline, faintly dusky beyond the nervures, nervures black. Legs black, with pale brownish or grayish pubescence, rufescent on inner sides of basal joints of tarsi; hind femora quite broad at ends, basal joint of hind tarsi quite stout. Abdomen short, suboval, convex, shining, strongly but not very closely punctured, first joint covered with sparse long pale ochreous pubescence; remaining joints with a sericeous pile, only noticeable in certain lights, when it will take more or less the appearance of bands. Apex with snow-white hairs. Ventral scopa black in middle and yellowish-white at sides.

♂.—A little larger; face and clypeus densely covered with silky white pubescence; pubescence of thorax a deeper ochreous, especially on scutellum. Antennæ long, flagellum rufous beneath. Colour of head and thorax a decided olive green. Wings not dusky beyond the nervures. Pubescence of last four legs sparse and black. Middle tarsi ordinary. Pile of second and third abdominal segments pale ochreous, that of the following segments black except narrowly along hind margin of fourth. Sixth segment with a shallow median depression; its hind margin with a very distinct rounded emargination. Apex with two long black spines.

Hab.—Mesilla Valley, N. M.; 3 ♀, 1 ♂ at flowers of plum, College Farm, April 9 (Ckll.); 4 ♀, 1 ♂ at flowers of *Sisymbrium*, College Farm, April 12th (Ckll.). Resembles *O. distincta*, but easily known by the bicoloured ventral scopa. The ♂ seems to resemble that of *proxima*, which I have not seen. This species is apparently referable to the subgenus *Chalcosmia*, Schmeid.

Osmia phenax, n. sp.

♀.—Length, 9 mm. This so closely resembles *prunorum* that I had confounded it with it. It differs in the following particulars: Head and thorax olive green, clypeus strongly purple on the disc. Flagellum ferruginous beneath. Pubescence somewhat thinner, and entirely rather dull white. Tegulæ shining rufotestaceous. Wings faintly dusky all over. Abdomen duller, olive green with faint purple tints, punctures larger and closer. Ventral scopa thin and short, pale fulvo-ochreous, uniform in colour. Small joints of tarsi more or less rufescent.

Hab.—Mesilla, N. M., at flowers of honeysuckle, April 13, 1895 (Miss J. E. Casad). Also one taken some time ago at Las Cruces, by Prof. Townsend. Easily known by the colour of the tegulæ, which is very unusual for *Osmia*. A specimen was compared by Mr. Fox with the Cresson collection, and returned with the note: "Near *distincta*, colour paler, and wings clear throughout, tegulæ testaceous, punctures of dorsulum stronger."

Osmia cerasi, n. sp. or var.

♀.—Length, 9½ mm.; stoutly built, very dark blue, greenish on vertex and dorsum of thorax, purplish on clypeus. Pleura sometimes black. This agrees with Cresson's description of *O. densa* in almost every particular, and may be only a southern variety of it; but it has the pubescence of the occiput and thorax above bright rust-red, as Cresson describes for *rustica*. The thorax is distinctly green anteriorly. The apical margins of the abdominal segments are dark blue, concolorous with the rest. Pubescence of pleura and face entirely black; ventral scopa black. Tegulæ black. Pubescence of abdomen short, black, except that on first segment, which is longer and pale fulvous. The punctures of the head and thorax are large, and about as close as it is possible for them to be; those of the abdomen are also close. Legs with black hairs.

Hab.—Mesilla, N. M., on flowers of cherry, April 14th, 1895 (Miss J. E. Casad); College Farm, Mesilla Valley, April 9th, 1895, on flowers of plum (Miss J. E. Casad). Also one taken at Las Cruces by Miss Agnes Williams (now Mrs. Herbert). The above three are all the species of *Osmia* observed in the Mesilla Valley.

NOTES ON EUPOEYA AND THE MEGALOPYGIDÆ.

BY HARRISON G. DYAR, NEW YORK.

I have had occasion to refer three times in these pages to the genus *Eupoeya*, placing it, with some doubt, in the *Megalopygidæ*. Very recently I have been so fortunate as to discover the larva in Florida on the mangrove. It is a true Eucleid, contrary to my expectation, but in confirmation of Dr. Packard's original statements. This genus, then, removed from the *Megalopygidæ*, renders it possible to define the family by the branching of vein 1 of primaries, instead of by the pectinations of the antennæ to the tip, which proves to be a fallacious character.

Megalopygidæ.

If the family be defined on this character, it appears unfortunate that *Aurivillius* does not refer to it, nor show that part of the wing in the figures in his recent paper on the group. *Aurivillius* would place the African genera *Somabrachys* and *Psycharium* in the *Megalopygidæ*, which is interesting, if well founded, as extending the geographical distribution of the family to the Old World. (*Iris*, Dresden, VII., 189, 1894.)

In CAN. ENT., XXVII., 244 (1895), I referred eight genera to this family. *Eupoeya* may now be omitted, but *Alimera bicolor*, Möschl., may probably be added. Recently Grote doubted (CAN. ENT., XXVII., 136) the correctness of Berg's union of *Lagoa* with *Megalopyge*. Möschler had previously expressed the same opinion (*Abh. Senek. Naturf. Gesell.*, XVI., 122) and stated that *nuda*, the type of *Megalopyge*, differs in antennal characters. "Die Fühler von *nuda* sind kurz, kaum halb so lang wie die Vorderflügel, beim ♂ an der Spitze äusserst kurz gekämmt, während dieselben bei *crispata* länger als der halbe Vorderflügel, stärker und bis am Ende gekämmt sind."

If we accept these characters as diagnostic of the two genera, our species separate as follows:

Genus MEGALOPYGE: contains *nuda* (type), *lanata* and *opercularis*.

Genus LAGOA: contains *crispata* (type) and *pyxidifera*.

The larval characters confirm us in dividing our species into two genera, since the larva of *opercularis* has the hair crested and curled and is furnished with a terminal tail-like tuft, while those of *crispata* and *pyxidifera* are evenly and smoothly haired.

Grote states that *Lagoa* is preoccupied, but I do not find this to be the case in Scudder's Nomenclator. *Pimela*, Clem. is preoccupied by *Pimelia*, Fab. (Coleop.)

The genera of the Megalopygidæ at present are as follows :

Aidos Hübn., Carama Walk., Mesocia Hübn., Podalia Walk., Ochrosoma H.-S., Sciathos Walk., Alimera Möschl., Megalopyge Hübn., Lagoa Harr., Sombrachys Kirb. (?) and Psycharium H.-S. (?)

The larva of Eupoeya.

The larva of *E. Slossoniæ* is flattened, green, with four dorsal red dots and fringed with a row of regular hairy appendages. They represent the subdorsal row, are detachable and furnished with heart-shaped basal pieces. There are no stinging spines. The form represents the same special adaptation as in *Sisyrosea*, but superimposed upon the phylogenetic characters of *Phobetron*. Our larva is a green *Phobetron* with all the appendages of the same length and the lateral tubercles atrophied.

Dr. Packard states that *Eupoeya* is not the Cuban *Phryne immaculata*, Grote, but he has neglected to compare the forms listed as *Euprotis argentiflua*, Hübn., *E. fumosa*, Grt., and *E. pygmea*, Grt., all from Cuba and one of which at least is a Eucleid as shown by Dewitz. (N. act. k. Leop.-Car. Deut. akad. nat., XLIV., 252).

It is curious that the Florida and Cuba forms of *Eupoeya* should be different species, while the recent description of a third form from Jamaica, by Schaus (Journ. N. Y. Ent. Soc. IV., 57), emphasizes this fact and renders it probable that still others will be found on other islands, possibly all mangrove feeders in the larval state.

FURTHER NOTES ON AUGOCHLORA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

A portion of my table of Mexican species, on p. 4, should be amended to read as follows:—

5. Hind margins of abdominal segments broadly black, blue-green or more or less purplish-tinted species.
 - (i.) Legs black; only the coxæ, and front femora behind, metallic *Townsendi*, n. sp.
 - (ii.) Legs metallic, blue or green; nervures fuscous.
 - a. Smaller, largely purplish, species *labrosa*, Say.
 - b. Larger, green species, 5th abdominal segment basally purple *Binghami*, Ckll.

Hind margins of abdominal segments narrowly or not black, yellowish-green species 6.

Augochlora Robertsoni, n. sp.

This species had apparently been confounded with *pura*, but Mr. Robertson, who takes it commonly in Illinois, has pointed out good distinctive characters in Tr. Am. Ent. Soc., XX. (1893), p. 146, under the name of *labrosa*, Say. I possess a ♀ specimen from S. Illinois, sent by Mr. Robertson, and accepting his identification of it, had placed *labrosa* in my table of Mexican *Augochlora*, from the characters it presented. Say described his *labrosa* from Mexico, however, and suspecting later an error in identification, I compared Say's description. The result is, that I am convinced that Say did not have Mr. Robertson's Illinois insect before him, and that the latter stands in need of a name, being apparently different from other described North American species. It is accordingly named after the writer who first pointed out its characters, which are, principally, the evenly punctured, not roughened, mesothorax, the broad face and deep emargination of the eyes, in the female; and the fourth ventral segment not broadly emarginate in the male. The stigma and nervures are brown, not very dark, the second submarginal cell is conspicuously longer (squarer) than in *pura*; the legs are very dark brown, the front femora metallic behind. In most respects, the insect is like *pura*, and could easily be confused with it.

Say's type of *labrosa* is said to be a ♀, while the allied *Binghami* is described from a ♂, but I do not think they can be the sexes of one species.

Augochlora Townsendi, n. sp.—♂. Length, 10 mm.; head and thorax densely and confluent punctured, brilliant blue-green, pleura becoming very strongly tinted with blue; but the face, especially the clypeus and supraclypeal area, yellowish-green, the latter with a coppery tint. Abdomen dark blue-green, not so blue as the thorax; hind margin of first segment narrowly, and of the others broadly, black; venter black, none of the segments emarginate, nor any trace of the fish-tail brush of *Binghami*. Face broad, emargination of eyes deep; clypeus shining, subcancellate with large punctures, its anterior edge very narrowly at sides, and the labrum, black; labrum striate, mandibles dark, only very faintly rufescent about the middle; antennæ reaching to scutellum, black, feebly rufescent beneath, not at all hooked at tip, first two joints of flagellum

broadly than long, the first a little the shorter; third about as broad as long. Prothorax with a very strong keel running to tubercles; mesothorax evenly and very closely punctured; scutellum very finely and closely punctured at the sides, the disc with a pair of small smooth sublateral areas, a yellowish green than the surrounding parts; post-scutellum very minutely punctured in the middle, coarsely subreticulate at sides; metathoracic enclosure distinct, shining, very blue, with numerous longitudinal ridges; sides of metathorax and the ill-defined truncation very closely punctured. Pubescence of head and thorax scant and pale, rather conspicuous on upper part of face, the hairs beautifully plumose. Tegulae piceous, the outer edge hyaline, the base greenish and with minute punctures. Wings dusky hyaline, stigma dark brown, nervures piceous, second submarginal cell much higher than long. Legs black, with thin white pubescence, coxae in front, and anterior femora behind, metallic blue-green; anterior tibiae in front, and anterior tarsi, rufescent, remaining tarsi more or less rufescent within; hind spur of hind tibia minutely ciliate. Abdomen with first segment having rather large, tolerably close punctures, and a small purple spot on each side; second segment with the punctures conspicuously smaller and closer; third with them still smaller, and much feebler; remaining segments with them minute and feeble. No hair-bands, but short pubescence, shining brilliant silvery in certain lights.

Hab.—San Rafael, Vera Cruze State, last of June; collected by Prof. C. H. T. Townsend on plant No. 31, which Dr. Rose says is a *Cordia*, probably *C. ferruginea*. The coloration of this beautiful insect is singularly like that of some new species of *Volucella* taken by Prof. Townsend at the same locality, especially in the effect of the pubescence and metallic colours on the abdomen. It resembles somewhat *A. urania*, Sm., and *A. feronia*, Sm., from Brazil. On the same flowers, at the same time and place as *A. Townsendi*, Prof. Townsend took both sexes of a lovely *Temnosoma*, either *T. smaragdinum* or possibly a new species, since it seems to differ from Smith's description, being larger, the head hardly quadrangular, the wings darker, etc., but it differs so little that it will be advisable to call it *smaragdinum*, Sm., var., until comparison of specimens can be made.

Plant No. 4 (see p. 6) on which *A. Binghami* was taken, has been identified by Miss Vail as *Calopogonium ceruleum* (Benth.) Britt.

A NEW PYRALID.

BY MARY E. MURTFELDT, KIRKWOOD, MO.

Titanio helianthiales, n. sp.

Alar expanse 15 to 16 mm.

Head small, with long, rather bristly scales, of which it is easily denuded, the colours mingled dingy white and buff; labial palpi projecting, elongate triangular, densely scaled, of a buff colour, indistinctly margined with white; maxillary palpi not in evidence; tongue slender, naked, eyes globular, large, purplish brown; antennæ silvery white above, pale brown beneath, the joints distinct and clothed with very short pubescence. Thorax buff with white median line, patagia buff, bordered more or less distinctly with white. Abdomen clothed with buff or fulvous scales, with indistinct bands of white at base. Legs shading from pale brown femora to yellowish-white tarsi. Wings broad. Fore wings, ground colour of black, buff and white scales intermingled, ranging from dark to light in proportion to the number of white scales, which is variable; a narrow, rather indefinite, white streak extends longitudinally from the base of the wing near the inner margin to about the middle; a more distinct white area has its base on the costa in the apical third extending obliquely backward about half across the wing; a narrow white line curves around the outer margin, diverging quite widely from the latter near the apical and the outer angles, most distinct near the costa, where it very nearly touches the base of the costal fascia, to this succeeds a dark band and a second narrower white line followed by a fine black marginal line; fringes white, variegated with two dusky bands. Hind wings yellowish-white at base, shading to dusky toward the outer margin, near which is an obscure whitish band; fringes similarly marked to those on fore wings. Under side of fore wings rather dark, silvery gray, except along the inner margin, where it is almost white; near the apical angle is a light spot, larger and of oblong form in the ♂, small and round in the ♀. Described from two ♂s and two ♀s. The combination of colours gives to the eye the general impression of pale purplish-gray, or "lavender"—to employ a milliner's term—and there is considerable variation in pattern and proportion of the silvery white scales, which makes an exact description difficult.

The adolescent stages of this insect are peculiarly interesting. It is a true leaf-miner and, so far as I have been able to learn, the only member of its family as yet discovered to have that habit. It works between

the cuticles of the leaves of the Russian sunflower and probably of other species of *Helianthus*.

The mine is large, translucent, of irregular shape, but covering an area of from two to two and one half square inches. The black, granular frass drops to the lower margin. The mine and included larva bear considerable resemblance, on a magnified scale, to those of some *Lithocolletis*. Full-grown larva, 15 to 16 mm. long, 3.5 to 4 mm. in diameter across middle segments, from which it tapers gradually toward either end. Form cylindrical, with rounded segments and deep incisions, giving it a sub-moniliform appearance. General colour whitish green, often with a rosy suffusion. Head small, broadly triangular, polished, faintly mottled, dark brown on the lobes, with dingy white, triangular face. The corneous, whitish-green collar has two large, glossy, brown spots covering the greater part of its surface; or, it might perhaps be better described as brown, with broad, pale anterior and lateral margins and medio-dorsal line. Each of the other segments has the usual arrangement of conspicuous, round, dark brown, piliferous spots, from which proceed very fine, short hairs.

The pupation is irregular. In some cases the mature larvæ desert their mines and inclose themselves in oval cocoonets on the surface of the ground, but as a rule they spin up within the mine, in a nidus of loosely-webbed frass, with an inner, more firmly woven cocoon immediately inclosing the pupæ. The latter are short, and thick, of a golden-yellow colour, without marked characteristics.

The imago appears in eight or ten days after the larva spins up.

The mines were discovered August 2nd, 1896, and in all probability were those of a second brood. Another series of mines was found on the sunflower leaves September 5th to 10th, the moths from which issued shortly and probably hibernated — no later mines appearing. I am indebted to my friend, Prof. Fernald, for the generic determination of this interesting species.

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SYNONYMICAL AND DESCRIPTIVE NOTES ON NORTH AMERICAN ORTHOPTERA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

In a review of N. A. Decticinae (CAN. ENT., XXVI.), I referred (p. 180) an undescribed Pacific Coast species provisionally to *Drymadusa*, an Old World genus of which I had not then seen specimens. Direct comparison shows that it differs from that genus in the lack of a humeral sinus on the posterior border of the lateral lobes of the pronotum and in the great posterior extension of the pronotum. I propose for it the generic name *Apote* (α , $\pi\omicron\tau\eta$). The species, which may be called *A. notabilis*, is testaceous, tinged on the pronotum with olive-green, the abdomen fusco-testaceous, much and minutely marked with black and light testaceous, the tegmina abbreviate but attingent, testaceous with black veins. The length of the body is 37 mm.; of the ovipositor, 28 mm. Oregon.

We have, however, another genus of Decticinae not given in my table, consisting of long-winged species still more nearly allied to *Drymadusa*, but separable from it by the slender form, much narrower head and fastigium, narrower tegmina and the less incrassate base of the hind femora, and by the presence of spines on both sides of the under surface of the fore femora, though these are inconspicuous on the outer side of one species. It may be called *Capnobotes* ($\kappa\alpha\pi\nu\omicron\beta\acute{o}\tau\eta\varsigma$) in allusion to the smoky aspect of the insects.

To this belong two species described by Thomas and referred to *Locusta*, and which I had not determined when I published my former paper. Prof. L. Bruner has kindly sent them to me, as well as two other species, one of them from Lower California. The three United States species may be separated by the following table:—

- a. Outer margin of fore femora distinctly spined beneath; metazona considerably elevated above the prozona, so that the pronotum is subselfiform.

- b.*¹ Metazona abruptly elevated above the prozona; anterior sulcus of pronotum very deeply impressed; ovipositor much shorter than hind femora; tegmina marked with pallid spots and streaks *fuliginosus*, Thom.
- b.*² Metazona gradually elevated above the prozona; anterior sulcus of pronotum distinct but not deep; ovipositor longer than the hind femora; tegmina nearly uniform in coloration... *Bruneri*, sp. nov.
- a.*² Outer margin of fore femora very faintly spined beneath; metazona scarcely elevated above the prozona, and the pronotum not subsellate *occidentalis*, Thom.

Fuliginosus was described by Thomas from a male from Arizona, and the specimen, a female, sent me by Bruner is from the same territory; *Bruneri* comes from California and was sent me by Professor Bruner; *occidentalis* was originally described from California, and the specimens I have seen come from Nevada and Utah. The sub-family Locustinae to which Thomas thought these species belonged has not been recognized in the New World.

On different occasions I have received from the extreme southwestern part of the United States specimens of a large speckled Acridian belonging to a generic type of Eremobiini very distinct from any known and differing widely from either of the two known genera of this group found in our territory. It may be called *Tytthotyle* (τιτθός, τέλη). It has a general Oedipodid aspect, not unlike *Anconia* or *Hadrotettix*. The body is not depressed, and but little compressed; the head is normal, with rather large and prominent eyes; the intraocular space, as seen from above, is narrower than the width of the eyes; the vertex is carinulate; the fastigium of the vertex sulcate, distinctly declivent, passing by a scarcely interrupted curve into the frontal costa; the latter is not very broad, contracted and sulcate just below the ocellus, then disappearing. The antennae are slender and shorter than the pronotum, at least in the female. The pronotum narrows rapidly from behind forward, is feebly carinulate with blunt lateral rugae or shoulders, the lateral lobes of equal width throughout; the metazona is a little longer than the prozona, subacutangulate posteriorly; the prozona is twice cut by transverse sulci, and is a little tumid on the disk. The tegmina and wings are fully developed and much longer than the body. The hind femora are scarcely compressed, of general Oedipodid form, merely carinate above; the inner and outer calcaria of the hind tibiae are subequal, and the arolea minute.

I know of but one somewhat variable species, described by Bruner as *Thrincus* (?) *maculatus*. Mr. Bruner has kindly sent me types of this for examination.

The tribe Thrincini has not been found in America. The second species which Bruner has referred doubtfully to *Thrincus*, viz., *T. aridas*, belongs to *Heliastus*, a genus of Oedipodini in near vicinity to the Thrincini. The species described by Thomas under the name *Thrincus californicus* also belongs to *Heliastus*.

Among the Oedipodini, *Mestobregma* Scudder and *Trachyrhachis* Scudder are synonymous and the former has priority.

In *Psyche* (vi. 265) I pointed out that my *Leprus ingens* from California belonged to a new generic type, for which I now propose the name *Agymnastus* (*ἀγύμναστος*) in allusion to its clumsy inactivity. It is most nearly allied to *Leprus* Sauss., but differs from it in its more bulky shape, due largely to the exceptional breadth of the mesosternum, its abbreviated organs of flight, which do not wholly conceal the abdomen when at rest, and the presence of a subcostal taenia reaching the base of the wings from the transverse fascia common to both genera; the posterior process of the pronotum also in rectangulate instead of rounded subacutangulate, and the intercalary vein of the tegmina is more or less obscure proximally and only a little nearer the median than the ulnar vein; the upper and lower carinae of the hind femora, and especially the lower, are subfoliaceous.

One of the genera of our Tryxalinæ has been very much named. It was first described by me under the name *Aulocara*, males only of which were seen. Very shortly afterward I redescribed it, from the female only, as *Oedocara*. A few years ago Brunner renamed it *Coloradella*, and recently McNeill has given it the name *Eremnus*; *Aulocara* of course has priority, and the species on which it was founded proves, as Bruner has already pointed out, to be identical with Thomas's *Stauronotus Elliotti*. The genus under the name *Oedocara* was included by Saussure in the Oedipodinae and by Brunner (as *Coloradella*) in the Tryxalinæ, an excellent illustration of the difficult definition of these two sub-families.

Some years ago, in *Psyche*, V., I attempted to show that certain genera that had been referred to Tryxalinæ should really be placed in the Oedipodinae. I now think I was mistaken, at least as regards all the genera found in our own country, and would follow Brunner in placing them in the Tryxalinæ. It was partly owing to my statements that Mr. McNeill has rejected them from his recent Revision of the Tryxalinæ.

The generic name *Beta*, proposed by Brunner in 1893 for two unnamed species in his collection from Texas and Colorado, is proved by a specimen sent me by him to be the same as my *Phlibostroma* (1875). His *Pseudostauronotus*, proposed at the same time and manner, is identical, as a specimen sent me shows, with my *Stirapleura*.

A REMARKABLE APPEARANCE OF CATOCALA INSOLABILIS.

On Friday, June 6th, 1896, the first *Catocalas* were noticed in this locality for the season. Three *Insolabilis* were taken. The weather was hot—87° in the shade at 1 o'clock. The Saturday following was also hot, and *Catocalas* were abundant. During the forenoon twelve were taken on trees near the house. In the afternoon twenty-one more were taken on trees at some distance from the house, and in the evening, at sugar, twenty-three more were captured. Of the entire number (56) fifty were *Insolabilis*, one *Nurus*, three *Ilia*, one *Uxor*, and one *Marmorata*. Sunday the weather was still hot, and on the way to and from church *Catocalas* could be seen on nearly every tree. The wind continued south-west. On Monday the wind had changed to south-east, and the *Catocalas* were still present, but resting higher up on the trees. This being a work day, I had but little time for observation or collection. After school hours, however, a few minutes were spent in the woods, and the *Catocalas* were found hard to capture. When startled they would light high up in the trees, sometimes fully twenty feet from the ground, and some would even alight upon the leaves of the trees. At dusk *Insolabilis* came to the sugar in abundance, and thirty were taken before it was dark enough to need a lantern. In all, fifty-seven were taken on Monday, all but five being *Insolabilis*. On Tuesday the wind was north-west, and not a *Catocala* was to be seen. Not one came to sugar that evening. The only *Catocala* that was seen on Tuesday was snapped out of a tree by a scarlet Tanager and immediately torn to pieces.

I have talked with other collectors of this vicinity, and all seem to have secured a goodly share of *Insolabilis*.

In the parks and suburbs of Chicago there were literally thousands of *Insolabilis* during the three days. Previous to this remarkable flight the species was not common, so far as I have been able to ascertain.

ARTHUR J. SNYDER, North Evanston, Ill.

DESCRIPTION OF THE STRUCTURAL CHARACTERS OF
THE LARVA OF SIBINE FUSCA, WITH NOTES ON
THE FOUR KNOWN LARVÆ OF SIBINE.

BY HARRISON G. DYAR, NEW YORK.

Stoll figures the moth of two species of Sibine. He also figures two larvæ of Sibine, but, owing to the unfortunate confusion into which his labels must have fallen, they are not attributed to the right imagines, but to two species of Diptidæ. After Stoll, Sepp also illustrated two species of Sibine, with their larvæ correctly shown. One of Sepp's species is the same as one of Stoll's, the other is different in both larva and moth. This gives three species of the genus known in both larval and mature states, assuming only that the larva which Stoll figures as *micilia* (228 G.) really belongs to the moth *nesea**, which I think is probably the case.

The names of the species are *nesea*, Stoll; *fusca*, Stoll (= *trimacula*, Sepp = *bonaerensis*, Berg. = ? *megasomoides*, Walker = ? *affinis*, Moeschler), and *vidua*, Sepp (= ? *fumosa*, Walk.). As a fourth species we have *stimulea*, Clemens (= *ephippiatus*, Harr.).

The larvæ have in common the following characters: (1) The shape of the body, which may be sufficiently described by a reference to the well-known *S. stimulea*; (2) the absence of subdorsal horns which bear stinging spines on joints 6 to 10; (3) the presence of a large patch of detachable spines above the horn on joint 13 and the lateral horn of joint 12; (4) probably the presence of skin spinules only without granules, though this can not be definitely asserted till the two species *nesea* and *vidua* have been microscopically examined; (5) the coloration involves a square green patch on the middle of the back, variously modified. Other characters are shared by the whole group of spined Eucleids.

SYNOPSIS OF THE LARVÆ.

The subdorsal horns which are present, long.

Lateral horns long; green, the horns all purple-brown, dorsal mark square, dark green, broadly edged with yellow.....*vidua*.

Lateral horns short.

Subdorsal horns and body green; dorsal mark square, without a central dark patch, edged before and behind with yellow....*nesea*.

Subdorsal horns and body purple-brown; dorsal mark elongate, projected below the posterior subdorsal horns, and bearing a central, elliptical purple-brown patch edged with white...*stimulea*.

* Stoll's so-called larva of *nesea* is an absurd error. It is a Notodontian with a long yellow horn on joint 6.

The subdorsal horns short; green, the dorsal mark much elongated, reaching the posterior end of the body and projected forward below the anterior subdorsal horns, edged with yellow. *fusca*.

The larva of *fusca* is evidently the most highly specialized. I have received a number of alcoholic specimens from Mr. G. Ruscheweyh, of Buenos Ayres, Argentina, under the name "*Streblota bonaerensis*," but I am unable to find any differences in either moth or larva from Sepp's figures. The coloration is largely lost in my material through the effect of the alcohol, but the outline separating the two shades of green can easily be traced, and is exactly as shown by Sepp and Stoll.

Larva.—As compared with *S. stimulea*, Clem., the body is of the same shape, or a little more flattened, but all the horns are short. Subdorsal horns present on joints 3 to 5, 11 to 13, about .5 mm. long, alike, bristly with stinging spines; absent on joints 6 to 10. Lateral horns on joints 3, 4, 6 to 12, even shorter than the subdorsals, sessile spined. A subventral row of two distinct pale setæ.

Dorsum broad, flattened, sides oblique, subventral space small, contracted. Segmental incisures deep, the depressed spaces (1) dorsal intersegmental paired, two lateral (4) and (6) all show as distinct black dots buried in the intersegmental folds; addorsal spots (2) also present, small. A large, elongate patch of detachable spines above the lateral horn on joint 12, and a smaller one above the horn of joint 13. Caltrop patches present on the bare tips of the lateral horns of joints 6 to 12 apparently, but nearly all the caltrops are lost in my specimens. The caltrops and spines correspond with those of *S. stimulea* (Journal N. Y. Ent. Soc., Vol. IV., plate 1, figs. 5 and 6). Skin not very finely spinulose, the bases of the spinules enlarged, approximating granules, but still bearing the sharp tips. Colour largely green, a line of dark spinules joining the subdorsal horns of joint 5 runs forward on each side below the subdorsal horn on joint 4, turns down behind the lateral horn of joint 3, and runs backward just above the row of lateral horns to joint 12, turns up over the subdorsal horn of 12, and joins its fellow again just above the horn on joint 13; a detached ring also surrounds the subdorsal horn of joint 11. This line evidently marks the joining of the dorsal green with a different tint, which obtains over the horns, the stigmatal region and the dorsum of joints 3 to 5. Thoracic feet and venter as usual; the spiracle on joint 5 moved up above the others.

Habitat.—If my synonymy is correct, *Sibine fusca* ranges throughout the eastern part of South America, from Guayana to Argentina,

DESCRIPTION OF THE LARVA AND PUPA OF
AULAX NABALI.

BY THOMAS W. FYLES, SOUTH QUEBEC.

The tall White Lettuce, *Nabulus altissimus*, Hooker, is a striking and graceful plant. At Quebec it is found in glades and on the edges of woodland roads. Its wand-like stems rise sometimes to the height of six feet, and end in panicles of greenish-white or pale straw-coloured flowers. The stems are hollow, but have a lining or inner coat of white downy pith, which in the summer is sometimes found to be broken with discoloured warts. Late in the fall, when the stems of the plant have become indurated and the pith has dried up, the warts are found to have developed into galls of the size, shape and colour of grains of hemp. I have found them in the stems from about six inches above the ground up to a height of three feet or perhaps more. Sometimes they appear in clusters, sometimes in rows, and sometimes singly at intervals. The proper inhabitant of each of these galls is a footless, spindle-shaped grub, one-eighth of an inch long. In colour it is like white wax, with the mouth organs brown. It is more pointed at the head than at the other extremity. It lies curled round in the gall.

Towards spring the pupal change takes place. This change may be hastened by warmth; the specimens I have kept in my study are now (January 9th) passing through it. A week or two after the change the pupa is of compact form, white, waxen, with amber-coloured eyes. The head is small, the thorax large and convex, and the abdomen ovate and closely joined to the preceding part. The legs are drawn up by the sides of the thorax, and the tarsi are stretched backwards under the body. The antennæ (beautifully translucent) are turned under the head and extended between the tarsi, reaching nearly to the end of the abdomen.

The perfect insects were described by Dr. Brodie, of Toronto, in the 25th volume of the CANADIAN ENTOMOLOGIST, p. 12. I copy his description for the benefit of those who may not have the volume at hand:

"♀.—Length, 2.50 xx. Antennæ 13-jointed; uniform brown; head and thorax black; abdomen shining brown, with a large anterior dorsal spot black; all the tibiæ, femora and tarsi brown, a little paler than the abdomen; wings ample, veins well-defined, hyaline, iridescent at certain angles."

"Abdomen of ♂ darker brown, and without the dark dorsal spot. From numerous specimens."

Dr. Brodie discovered the galls in great abundance at the roots of the White Lettuce. I have not yet found them at the roots of the plant, and I am inclined to think that the insects are less numerous at Quebec than Toronto.

A NEW SPECIES OF ANCYLOXYPHA.

BY G. H. FRENCH, CARBONDALE, ILL.

Ancyloxypha Longleyi, n. sp.

Female.—Expanse 1 inch. Fore wings with the costa more straight from the shoulder to near the apex than in *Numitor*, in this respect approaching *Thymelicus*; apex rounded, but less than in *Numitor*; outer margin and hind wing rounded, much as in *Numitor*; antennæ reaching but little more than one-third the distance to apex of fore wings; palpi as in *Numitor*, but the third joint longer; abdomen surpassing hind wings, but less so than in *Numitor*; the whole insect more robust than *Numitor*.

Fore wings brown, darker than in *Numitor*, without the discal yellow patch, emitting a pale blue sheen in reflected light; a few yellow scales below the costa between the venules, and a few scattered on the base of the wing, but in either case not enough to give a yellow colour; otherwise the wing is uniform brown. Hind wings marked and coloured as in *Numitor*; yellow, with outer and costal borders and base brown, the brown along internal margin running to a point before reaching anal angle.

Under side differing very little from the under side of *Numitor*; the dark central and posterior area of fore wings a little darker brown, the costal and outer margins yellow, the yellow running to a point before reaching the posterior angle. Hind wings uniform yellow.

Antennæ black, annulate with white; club black, tipped with brown—the club of *Numitor* is tipped with black; palpi white at sides, black above, terminal joint black; thorax concolorous with fore wings, abdomen concolorous with hind wings.

The above description is drawn from a single specimen taken at Ridgeland, near Chicago, September 6th, 1896, by Mr. W. E. Longley, in whose cabinet it is and after whom I have named the species. In describing the species I have compared the specimen with *Numitor* because that species is so common all over this portion of our country. I hope the Chicago collectors will be on the lookout for this species the coming season.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.

The size and beauty of the Longhorns are in themselves sufficient to render them objects of interest to a beginner; adding to this the fact of the great abundance of certain species and the destructive work of their larvæ, we can readily understand their importance to all who are in any way interested in Entomology, whether as a pleasant recreation for leisure hours or a serious pursuit for gain. Although usually easily recognized by sight, the family is, as stated by Dr. Leconte, almost impossible to define. The tarsi are apparently four-jointed, the fourth joint being very small and connate with the fifth. The antennæ are usually very long, especially in the males, filiform or serrate, often borne on large frontal tubercles. The eyes are frequently deeply emarginate. Tibial spurs are present. The larvæ are grub-like, living in burrows or chambers which they excavate for themselves in the woody tissues or in the pith of plants, the pupa resting in a cell constructed by the larva in its gallery.

The collector will obtain many species of this family by carefully beating branches (especially if partially dead) and flowers, over a sheet or an umbrella. Dead logs should be searched, on both the upper and lower surfaces, and particularly freshly-cut timber or sawed lumber. A morning spent in a wood yard will often repay one richly in rare specimens. Some are to be found commonly under bark and may be trapped by loosely fastening pieces of bark to a tree over night and examining the under side of bark in the morning. A great number fly to lights after dusk. Dead twigs and branches may be sawed or cut off, preferably during the autumn months, and kept in large boxes or in an empty room until the beetles are disclosed through the development of the larvæ contained therein. While the activity of the Canadian collectors has already resulted in the recording of a great number of species, there can be no doubt that others will reward the efforts of explorers of the more remote districts.

Although mostly of at least moderate size, and after once identified easily recognized again, their classification presents considerable trouble owing to the fact that structural characters are so unstable and consequently of less than usual value for the separation of large groups. In the main, the arrangement adopted is that presented in the Leconte and

Horn "Classification," though the tables are constructed on a different plan and on account of the limits of the fauna it has been possible to do away altogether with the use of certain characters difficult of observation.

The prothorax in the Longhorns offers two principal types: that in which the lateral edge is sharp or thin for almost or quite the whole length, more or less toothed, giving us the form called *margined*, and that where it is cylindrical or rounded on the sides, which may, however, be either spined, tuberculate or plain. Thus we have a point of departure for sub-family separation, which may be aided by taking into account, among those genera in which the thorax presents the second form, a study of the palpi. These may have the terminal joint more or less compressed or subtriangular as in the Cerambycinæ, or this joint may be cylindrical and pointed at tip as in the Lamiinæ. The front tibiæ in the latter group have an oblique sulcus or groove on the inner surface, not always very distinct, but to be seen without difficulty in the larger species like *Monohammus*; once seen it may be used with some facility elsewhere. In the Cerambycinæ this groove is wanting.

Following the Classification, we may, then, throw the characters into tabular form, separating three sub-families, thus:

Prothorax margined, antennæ not pubescent, labrum connate with the epistoma PRIONINÆ.

Prothorax not margined, labrum free.

Front tibiæ not grooved; last joint of palpi not acute at tip, often subtriangular... CERAMBYCINÆ.

Front tibiæ with an oblique groove on the inner side; palpi with last joint cylindrical, pointed at tip..... LAMIINÆ.

The Canadian species of the first sub-family, the Prioninæ, are but three in number and represent as many genera. All of them are of rather large size, brown colour, and with elytra of a leathery appearance. The genera may be distinguished thus:

Sides of prothorax two- or three-toothed.

Form elongate, parallel; antennæ more slender, joints not overlapping... *Orthosoma*.

Form stout; antennæ heavy, joints overlapping, especially in the male *Prionus*.

Sides of prothorax with one tooth, antennæ slender..... *Tragosoma*.

ORTHOSOMA, Serv.

Represented by *O. brunneum*, Forst. (Fig. 12), a large brown insect, .88 to 1.60 in. long, the elytra nearly parallel-sided, shining and rather thickly punctured. Prothorax more coarsely sculptured above than the elytra, each side with three sharp teeth. The head bears a deep, sharp impression between the eyes. The basal antennal joints are stouter in the males than in the females. I have found the larvæ in rotten pine timbers under sidewalks.



FIG. 12.

PRIONUS, Geoff.



FIG. 13.

The largest Canadian Longhorn is *P. laticollis*, Drury (Fig. 13). It varies in length from .88 to 1.88 in., and is of a brownish or blackish colour, the prothorax almost or quite as broad as the base of the elytra, sides with three teeth, of which the posterior is sometimes poorly marked. The elytra are much broader at base than at apex. Antennæ twelve-jointed in both sexes, much heavier in the male. The larva (Fig. 14) is said to injure the grape, poplar, apple, and pine, by boring in the roots.

TRAGOSOMA, Serv.

T. Harrisii, Lec. (now considered by some writers as identical with the European *T. deysarium*, L.), is a curious-looking beetle of elongate form and brownish colour. The antennæ are slender, the prothorax small in comparison with the elytra, very hairy and armed on each side with a single sharp tooth, in front of which the lateral margins are convergent. The elytra are shining, distinctly punctured and with numerous longitudinal raised lines. I have taken the species under pine bark. It varies in length from 1.20 to 1.40 in.



FIG. 14.

The next sub-family, the Cerambycinæ, is of great extent, and in consequence more difficulty is encountered in arranging the genera. In the use of the table considerable care must be exercised by those who are unfamiliar with the structure of the Longhorns. This is especially true of the first character involved, *i. e.*, the enveloping of the base of the antennæ by the eyes. In order to obtain a proper appreciation of this structure, the antennæ should be extended forward from the head: in this position it will be seen that in those genera where the "base of the antennæ is partially enveloped by the eyes" a line passing from the anterior or inner border of the upper lobe of the eye to a corresponding point on the lower lobe will pass through the antennal socket, whereas in the other genera this line would run behind the socket. Of course none of the genera in which the eyes are entire (*i. e.*, not emarginate) will belong to the former category, though those with emarginate eyes may belong to either. Comparisons of a few specimens ought to make this clear.* The remaining characters may be easily verified by careful examination of a few species the positions of which are already known to the student, and with these as a point of departure he should meet with no greater difficulty than is always to be expected in dealing with a group of large size, wherein colour and sculpture are inconstant and secondary sexual characters well marked. The following table is submitted for generic discrimination; a short account of the method of using may be useful to some. Suppose on taking up our insect, which we have previously ascertained to belong to this sub-family, we examine the position of the base of the antennæ with regard to the eyes, since this is the first point of departure: ascertaining the antennal bases to be partly enveloped, we find ourselves referred to the number 12 at the end of the line. We now run down along the numbers at the *beginning* of the lines until we reach 12, which shows us where to recommence our analysis, with a scrutiny of the second antennal joint. Suppose we find this joint large, we are referred to the number 36, under which (on searching out its position at the beginning of a line) we are again confronted with a query, this time as to the relative proportion of the second joint to the fourth; if these two joints are about

*Cases will, however, arise in which this point is in doubt. In such an event the choice will rest between the Callidioides and the Cerambycoides. The former have the second antennal joint larger (as a rule) than the latter, but I can find no hard and fast distinction which will serve the beginner as a sure test. A certain number of properly named specimens serving as a guide to tribal and generic facies is almost indispensable here. It should be stated that the table is based on the characters developed in the "Classification," but is intended to apply only to the Canadian fauna.

equal, our insect belongs to *Microclytus*. The generic sequence followed in succeeding pages is the same as that employed in the table and is hence slightly different from the Henshaw Check-list.

TABLE OF GENERA OF SUB-FAMILY CERAMBYCINÆ.

| | |
|--|-----------------------|
| Base of antennæ not enveloped by the eyes | 2. |
| Base of antennæ partially enveloped by the eyes | 12. |
| 2. Front coxæ transverse, not prominent (<i>Callidioides</i>) | 3. |
| Front coxæ conical, prominent (<i>Lepturoides</i>) | 37. |
| 3. Eyes divided, apparently four in number | <i>Tetropium</i> . |
| Eyes not divided, often deeply emarginate | 4. |
| 4. Brown species, second antennal joint proportionately larger, often half as long as the third and sometimes twice as long as wide. Elytral costæ usually distinct | 5. |
| Variously coloured, often ornate species, second antennal joint proportionately smaller, often much less than half the length of the third and never much longer than wide. Elytral costæ usually indistinct | 6. |
| 5. Eyes hairy, finely granulated | <i>Asemum</i> . |
| Eyes not hairy, coarsely granulated | <i>Criocephalus</i> . |
| 6. Elytra with narrow raised white lines, prothorax with very deep median groove, thighs strongly clubbed | <i>Physocnemum</i> . |
| Elytra without distinct raised white lines (traces are sometimes visible in <i>Merium</i>) | 7. |
| 7. Prothorax very short, strongly rounded on the sides. Upper surface entirely opaque, lustreless. Black, prothorax red | <i>Rhopalopus</i> . |
| Prothorax not very short, the width not apparently much exceeding the length. Upper surface at least moderately shining | 8. |
| 8. Thighs more slender; antennæ with the eleventh joint divided in the male. Colour above blackish, prothorax red | <i>Gonocallus</i> . |
| Thighs strongly clubbed, colour variable | 9. |
| 9. Anterior coxæ contiguous | 10. |
| Anterior coxæ at least moderately distant | 11. |
| 10. Palpi unequal, the labial much the shorter | <i>Phymatodes</i> . |
| Palpi about equal | <i>Callidium</i> . |
| 11. Dorsal surface of prothorax with narrow median and moderate or small lateral callosities | <i>Hylotrupes</i> . |
| Dorsal surface of prothorax with a very broad, smooth, shining median space, which bears a few large punctures. Elytra with more or less distinct raised lines of a yellowish or whitish colour | <i>Merium</i> . |

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12. Second joint of antennæ large (*Cerambycoides*).....36.
 Second antennal joint small.....13.
13. Eyes coarsely granulated.....14.
 Eyes finely granulated.....21.
14. Front coxal cavities open behind.....15.
 Front coxal cavities closed behind; small pale species with the first
 abdominal segment very long.....20.
15. Scutellum acute, triangular, antennæ very long, prothorax with lateral
 spine.....*Chion*.
 Scutellum rounded behind.....16.
16. Elytra with elliptical elevated ivory-like spots, in pairs.....*Eburia*.
 Elytra without raised ivory-like spots.....17.
17. Femora not strongly clubbed, antennæ spinose.....18.
 Femora strongly clubbed.....19.
18. Large species; metathoracic episterna narrower behind..*Romaleum*.
 Moderate-sized species, episterna parallel.....*Elaphidion*.
19. Antennæ bisulcate externally.....*Tylonotus*.
 Antennæ not sulcate nor hairy.....*Heterachthes*.
 Antennæ not sulcate but quite hairy.....*Gracilia*.
20. Prothorax much narrower at base than at apex.....*Phyton*.
 Prothorax dilated at middle, but about equal at base and apex..*Obrium*.
21. Elytra either very short, not covering the abdomen, or rapidly narrow-
 ing behind and broadly dehiscent along the suture.....22.
 Elytra normal, not abbreviated nor notably dehiscent.....23.
22. Elytra about as long as the prothorax.....*Molorchus*.
 Elytra about twice as long as the prothorax.....*Callimoxys*.
23. Scutellum rounded or (in *Cyllene*) broadly triangular.....24.
 Scutellum acutely triangular.....25.
24. Tibial spurs small, thighs suddenly and strongly clubbed. Form slen-
 der and cylindrical. Black, elytra and abdomen scarlet..*Ancylocera*.
 Tibial spurs large.....27.
25. Prothorax opaque, sides with spine or large tubercle.....26.
 Prothorax shining, sides unarmed.....*Batyle*.
26. Elytra coarsely punctate, sutural angle produced.....*Purpuricenus*.
27. Tibiæ strongly carinated, form slender. Elytra without narrow cross-
 bands of pubescence, punctuation sparse and coarse. Antennæ
 as long (♀) or longer (♂) than the body.....*Stenosphenus*.

- Tibiae not carinated, form usually stouter. Elytra in most cases with lighter coloured angulated cross-bands; antennae usually shorter than the body in both sexes. Punctuation fine 28.
28. Head comparatively small, front short, oblique; legs hardly clubbed. Intercostal process of first ventral rounded 29.
- Head large, front long, intercostal process acute 32.
29. Prothorax transversely excavated at sides near the base, prosternum perpendicular at tip *Cyllene*.
- Prothorax not excavated at sides, which are rounded and constricted at base. Prosternum declivous at tip 30.
30. Antennae filiform 31.
- Antennae subserrate, compressed. Size large, colours strikingly contrasted with black and yellow bands *Plagionotus*.
31. Large species, prothorax entirely black, much rounded on the sides *Calloides*.
- Smaller, less robust; prothorax with central black spot, the remainder clothed with gray pubescence, sides much less rounded *Arhopalus*.
32. Elytra plane; moderate sized species 33.
- Elytra gibbous at base; small ant-like species 35.
33. Head with a carina of variable form *Xylotrechus*.
- Head not carinated 34.
34. Prothorax with transverse dorsal rugae or ridges *Plagithmysus*.
- Prothorax without transverse ridges *Clytanthus*.
35. Elytra with a transversely oblique ivory-like band *Eudermes*.
- Elytra without ivory band *Cyrtophorus*.
36. Second joint of antennae equal to the fourth *Microclytus*.
- Second joint of antennae less than half as long as the fourth *Atimia*.
37. Elytra short, not covering the wings *Necydalis*.
- Elytra normal 38.
38. Joints 3 to 5 of antennae much thickened at their tips, inner angle sometimes much produced. Large insects, bright blue with an orange band across base of wing-covers *Desmocerus*.
- Joints 3 to 5 of antennae normal, usually slender and never produced inwardly at tips. Elytra usually tapering to apex, sometimes more or less dehiscent 39.
39. Spurs of hind tibiae terminal 40.
- Spurs of hind tibiae not terminal, but borne at the base of a deep excavation. Thorax tuberculate or spinose at sides *Toxotus*.

-
40. First joint of hind tarsi with the usual brush of hair beneath (except in certain *Acmaops*). Prothorax, with rare exceptions, distinctly tuberculate at sides or with heavy lateral spine. Head obliquely narrowed behind eyes.....41.
 First joint of hind tarsi without brush-like sole. Prothorax, with few exceptions, broadest at base, sides never spined and rarely tuberculate. Head suddenly constricted behind the eyes.....46.
41. Antennæ short, joints 5 to 11 wider. Prothorax with a heavy spine at sides, elytra strongly costate *Rhagium*.
 Antennæ long or moderate, not thickened, elytra never strongly costate.....42.
42. Eyes large or moderate. Thorax (except in *Pachyta monticola*) with sharp, strong, lateral spine.....43.
 Eyes small, not emarginate, prothorax angulate or rounded on sides..45.
43. Eyes coarsely granulated, very prominent; form of body parallel..... *Centrodera*.
 Eyes finely granulated; body narrowed behind.....44.
44. Eyes feebly emarginate..... *Pachyta*.
 Eyes more strongly emarginate..... *Anthophilax*.
45. Mesosternum not protuberant, body above more or less pubescent, sometimes moderately shining *Acmaops*.
 Mesosternum protuberant, body above brilliant metallic green..... *Gauroles*.
46. Head constricted far behind the eyes, neck consequently very short.
 Form extremely slender, hardly tapering behind, prothorax with lateral tubercle *Encyclops*.
 Head constricted close behind the eyes. Form variable, usually much narrowed behind, prothorax rarely bulging at sides and never with distinct tubercle.....47.
47. Last ventral of male deeply excavated.....48.
 Last ventral of male not excavated.....49.
48. Antennæ without poriferous spaces, size large, sides of elytra deeply sinuate..... *Bellamira*.
 Antennæ with impressed poriferous spaces on sixth and following joints. Size moderate, sides of elytra sinuate, form very slender..... *Strangalia*.
49. Antennæ with poriferous spaces..... *Typocerus*.
 Antennæ without poriferous spaces..... *Leptura*.

THE LOST LEDRA AGAIN.

BY HERBERT OSBORN, AMES, IOWA.

The interesting note by Prof. Baker on *Ledra perdita* (*Centruchus perdita*, A. & S.) deserves notice on account of the mystery which it clears up, and it may also be worth while to add some testimony in the way of corroborative evidence.

A few weeks ago (Dec., '96) I had occasion to review the matter in an attempt to locate the *perdita*, and, in a critical examination of Amyot and Serville's figure and description, was struck by the resemblance to our common *Microcentrus caryæ*. On careful comparison, however, with this species and with the *Centruchus Liebeckii* of Goding, I concluded the figure and description must apply to the latter. It seemed so strange that a connection so obvious, when once seen, should have so long escaped the attention of Homopterists that I made a further search in the available literature, with the result of finding in a note by Dr. Goding, on "Fitch's Types of N. A. Membracidae" (CANAD. ENT., Vol. XXV., p. 172), the statement that "No. 2152, labelled *Ledra perdita* and *capra*, Mels., is *Centruchus Liebeckii*, Godg." There is no comment to indicate that Dr. Fitch corrected the family reference from Ledridæ to Membracidae, but considering his familiarity with the Homoptera in general, and the Membracidae in particular, it is probable that he appreciated the full significance of his specific determination, and it is quite likely that his unpublished notes would show comments on this reference.

In any case, we have the testimony of Dr. Fitch in identifying his specimen as *Ledra perdita* and its recognition by Dr. Goding as *Centruchus* to confirm Prof. Baker's conclusion.

OCCURRENCE OF SCHISTOCERCA AMERICANA (DRURY)
AT TORONTO.

Mr. C. T. Hills recently brought me a specimen of the large, handsome locust, *Schistocerca Americana*, Drury, which was taken about the 12th of October, 1896 (the exact date was not recorded), by Mr. H. Parish, while collecting at High Park. Mr. Parish found the insect resting on the trunk of a tree. The specimen is a female, in perfect condition, measuring 4.75 inches in expanse of wing, and is in every respect similar to examples of this species which I have from Tennessee. This is only the second time it has been taken in Canada; Mr. J. A. Moffat having recorded it from London (CAN. ENT., XXVII., p. 52.).

E. M. WALKER, Toronto.

NEW COCCIDÆ FOUND ASSOCIATED WITH ANTS.

BY GEORGE B. KING AND T. D. A. COCKERELL.

[The species described below were all collected by Mr. King. The notes on the microscopical characters were prepared by Mr. King, but have been extended and rewritten from Mr. King's mounts by Mr. Cockerell, who is also responsible for the comparisons with allied species. The notes on the living insects, habitat, etc., are all by Mr. King.]

Lecanopsis lineolata, n. sp.

♀ (cleared and mounted).—Oval, length somewhat over 2 mm., dermis practically colourless, legs and mouth-parts tinged with sepia, anal plates a warm yellowish-brown, quite a different colour from the legs. The mouth-parts inclined rather to a madder-brown. Legs and antennæ small, hind legs not nearly reaching the anal plates, tip of femur of middle legs reaching extreme base of hind legs. Posterior cleft wide. Antennæ fairly stout, gradually decreasing in size distad, 8-jointed: 3 longest, not quite twice as long as broad; 2 and 4 next, and about equal; 5 and 1 of about equal length, but 1 much broader than long, 5 longer than broad; then the last three subequal, but 8 the longer. Formula 3 (24) (15) 8 (76): 8 with several small hairs. Anterior tibia and tarsus as long as antennal joints 2 to 6, the tarsus about half as long as tibia; femur very stout, not as long as tibia on its inner side, but a little longer on its outer; trochanter and coxa both very large. The legs are altogether noticeable for their stoutness, but the basal parts are especially enlarged. Claw large, moderately curved, digitules of claw stout, extending beyond its tip; tarsal digitules filiform, all but two broken off in the specimen. The claw-digitules are enlarged at ends to an obliquely truncate club, but the tarsal digitules with only an excessively minute club. There is the usual long bristle at the tip of the trochanter, and a short erect hair a little way up the femur on the inner side. Anal plates rather broad, the caudolateral side a little longer than the cephalolateral; a large bristle near the tip and another at the extreme base; these bristles are very large, and may possibly be dermal, beneath the plates; especially as there is a corresponding pair on the skin laterad of the plates, that opposite the hindmost bristle being considerably shorter than it. Hairs of anal ring broken, but apparently they were stout and not numerous. Skin without any distinct markings; marginal spines fairly large, pointed, simple, easily deciduous, a very little further apart than the length of one. Stigmatal spines in threes, one long, two much shorter but not very short.

Hab.—With *Cremastogaster lineolata*, two specimens in a nest at Lawrence, Mass., July 15th, 1894.

This is not a strictly typical *Lecanopsis*, but belongs apparently in the subgenus or genus *Spermococcus* of Giard. By its 8-jointed antennæ it resembles *L. formicarum*, Newstead, but it differs at once from that by the smaller (though still large) first antennal joint, the longer second joint, the much longer third joint, the femur decidedly stouter, the tibia not beset with numerous bristles, and the claw-digitules stout. *Lecanopsis* is simply a segregate from *Lecanium*, modified for underground existence. Maskell's *Lecanopsis filicum* hardly belongs here; in some respects, but not in others, it seems to approach *Myxolecanium*; it also recalls in some of its characters such forms as *Lecanium Urichi*.

Phenacoccus americana, n. sp.

♀.—When alive fusco-testaceous, smooth, soft, sticky, and free from any wax or down; when put into alcohol its colour changes to a rufous-violaceous, and it becomes quite wrinkled, its general form is rounded, with a slice of nearly one-fourth cut off, making its under surface flat. Length (in alcohol) $3\frac{1}{2}$ mm., width 3 mm.

♀ (cleared and mounted).—Oval, brown of a rather warm sepia tint, antennæ and legs very pale yellowish. The legs are slender, and although the insect is much larger, its legs are not so large as those of some of the ant's-nest species of *Ripersia*; but at the same time they are well-formed and ordinary, not shortened or swollen as in the *Lecanopsis*. Trochanter with one long and at least two short bristles. Femur little longer than tibia, its inner margin straight, with four or five erect bristles; its outer margin very gently arched or bent, with a conspicuous erect bristle at the bend. Tibia slender, with eleven conspicuous bristles, tending to form three whorls. Tarsus rather over two-thirds length of tibia, with similar but finer bristles, no nobbed tarsal digitules. Claw large, little curved, with a minute denticle on inner side near the tip; digitules of claw extending beyond its tip, slender, with hardly noticeable knobs. Antennæ slender, club not conspicuously swollen, formula 9 (123) (45678), or it might be written as well 9132 (87) (456), but the additional differences indicated by the latter formula are almost too slight to be accurately measured by the eye: 9 is very nearly as long as 7+8; 1 is cylindrical, its base not noticeably wider than the apex. The joints have sparse whorls of hairs, 9 having two such whorls. Eyes prominent. Mouth-parts small, mentum (so-called) very obscurely or not

dimerous, broad and short, its apical half with three whorls of erect bristles. Skin with sparse small round gland-spots.

Hab.—Andover, Mass., Oct. 27th, 1896, under a stone in the nest of *Lasius americanus*, Emery. A small colony of five individuals captured, and only one herd as yet found; they were not feeding on any roots entering the nest of the ants, but were altogether on the surface of the nest, and some of the ants were attending them. It is to be presumed that they would eventually produce cottony matter.

Both by colour and habits this differs at once from *P. aceris*, Sign., which has been recorded from Massachusetts, and there is no species with which it is likely to be confounded.

Ripersia Blanchardii, n. sp.

♀.—Dark reddish-purple, segments prominent, much broader in front, pointed behind, subglobular or subelliptical, convex, antennæ short and thick. Length, 2 mm.; breadth, $1\frac{1}{2}$ mm.

♀ (cleared and mounted).—Skin quite thickly beset with round gland-spots, and also minutely hairy, the minute but abundant pubescence being a striking characteristic of the species. So abundant are the hairs in the vicinity of the anal ring that it is impossible to be sure how many really belong to the latter, though there seem to be six, the usual number. The legs, antennæ and mouth-parts are tinged with ochreous, and are large for the size of the insect; particularly the mouth-parts, which have at least twice the diameter, and many times the bulk, of those of the larger species *Phenacoccus americana*. The mouth-parts are also much broader in proportion to their length than in *P. americana*, and the rostral filaments are quite stout. The antennæ are stout, 6-jointed, just about as long as in *P. americana*, but very much stouter and quite different in appearance. The formula is (36) 21 (45), but if anything, 3 is a little longer than 6; 3 about twice as long as broad; 4 and 5 broader at apex than at base, so that the sutures between 3 and 4, 4 and 5, and 5 and 6, are very deep, the last two approaching a right angle. The whorls of hairs are very sparse. The legs are also peculiar; fully a third longer than in *P. americana*, and very stout, with large coxæ and trochanters, they are tolerably thickly beset with small hairs. The tarsus is somewhat over two-thirds the length of the tibia, and tapers quite rapidly from a broad oblique base, it shows a slight tendency to be jointed a little before the

end. Claw large, moderately bent, on one leg minutely notched at the end. Digitules wanting; there is a small bristle in the place of the claw-digitule.

Hab.—Haverhill, Mass., Oct. 4th, 1896, in a nest of *Lasius claviger*; Rog., under a stone with a small herd of another species; only one found, not feeding. Named after Mr. Blanchard, who has interested himself in the Coleoptera associated with ants in the same region.

Of the Massachusetts species, this most resembles *R. lasii*, particularly in the antennæ, but it differs widely in its colour, hairiness and stout legs. Still less does it seem to resemble any of the foreign species.

Reviewing the above three species, it seems that the *Lecanopsis* is most modified for an underground life, the *Ripersia* somewhat, but the *Phenacoccus* hardly or not at all. It is probable that the last will be found in summer on some plant above ground.

ARGYNNIS IDALIA IN NEW BRUNSWICK.

On February 1st I happened to spend a few hours in St. John, N. B., and through the kindness of Mr. Herbert E. Goold, of Sussex, N. B., and Mr. A. Morissey, of St. John, I was enabled to visit the very interesting museum of the Natural History Society of New Brunswick. In looking over the cases of insects I noticed two fine specimens of *Argynnis idalia*, which Mr. Goold told me were taken by himself or his father at St. John. I could not remember at the time any record of *A. idalia* having been taken in New Brunswick, so asked Mr. Goold to enquire from his father if he remembered anything of the capture. He has since written to me: "In *re Argynnis idalia*—On my return home from St. John I asked my father about the specimens. He remembered the circumstances of their being caught distinctly, as he was perfectly familiar with the insect, having been one of the most active members of the entomological branch of the Natural History Society of Portland, Maine. In 1880 quite a number of specimens of *A. idalia* appeared in the vicinity of St. John, and the specimens you saw were taken at that time." It is to be deeply regretted that at the present time very few members of the strong local Natural History Society at St. John are studying entomology. The locality is one of extreme interest scientifically, and very much requires working up.

J. FLETCHER, Ottawa.

[In the C. E. for March, 1896, Vol. XXVIII., p. 74, the capture of a specimen of *A. idalia* at Windsor, Ont., is recorded.—Ed. C. E.]

certain breakage, or if placed unmounted in envelopes, these should be of soft paper, loosely packed, so that the eyes will not be crushed.

In my own field work upon Dragonflies I try to cover for each species the points of the following outline :

I. Imago.

- (1) Name ; locality ; date ; occurrence ; etc.
- (2) Haunts : places frequented ; places avoided ; the reasons, if discoverable.
- (3) Flight : its hours ; its duration ; its directness ; average altitude ; places of rest : altitudes.
- (4) Food : its kind ; how obtained ; where eaten.
- (5) Enemies : what are they, and how do they destroy Dragonflies ?
- (6) Oviposition : does the ♀ oviposit alone or attended by the ♂.
- (7) The eggs : where placed ; number in a place ; incubation period.

II. The Nymph.

Points 1, 2, 4 and 5 of above, and Imagination : hours ; places ; distance from water ; etc.

I shall have to admit at once that it is very difficult to determine all these points for a single species, but the effort will lead on into delightful intimacy with these beautiful insects.

At the kind invitation of the editors, I venture to say to the readers of this magazine that I am now engaged upon a semi-popular monograph of N. American Dragonflies, which, in so far as it includes accounts of habits and life-histories of the species, must of necessity be a co-operative work. And I have written this to invite co-operation. The foregoing simple methods are the very best. I will furnish (if desired) half a dozen named nymphs of typical genera to any one who will undertake to collect and rear others. I shall be very willing to determine nymphs or imagoes for any one, and to point out for description such as are new. But I especially desire that accurate field observations and notes be made on many of our species of which we now know only the names, and to such observers I will give all possible aid.

THE ANNUAL REPORT of the Entomological Society of Ontario for 1896 is now in type and will soon be ready for distribution.

Mailed April 1st, 1897.

them thriving. The water should be reasonably clean. Three things should be carefully observed. (1) There must be a surface up which they can climb to transform: if the sides of the kit are too smooth put in some sticks; (2) there must be room enough between the netting cover and the water for complete expansion of their wings; (3) they must remain out of doors where the sunshine will reach them. This last point especially is essential to success. But there is still an easier way to do it, and one which, when a species is very common, will prove entirely satisfactory. The several nymphal stages (excepting the youngest, not likely to be collected) are very much alike. I am in the habit of preserving the younger nymphs and putting into my kits only those well grown, as shown by the length of the wing-cases, which should reach the middle of the abdomen. But if, when a species is becoming common, one will go to the edge of the water it frequents, at the time of its emergence, one may find nymphs crawling from the water, others transforming, imagoes drying their wings, and others ready to fly, and may thus obtain in a few minutes the material necessary for determining nymph and imago. The time of emergence may be determined by noticing at what time pale young imagoes are seen taking their first flight, and then going out a little earlier. The unfortunate thing about it is that many of the larger species transform very early in the morning, and to take such advantage of them one must be on the ground between daybreak and sunrise.

Several imagoes should be kept alive until they have assumed their mature colours. It is most important that each imago and its cast skin should be kept together.

Eggs, also, are easily obtained. Every collector has seen the female of the species figured on the front of this magazine, or of related species, dipping the tip of her abdomen into the surface of the water, depositing eggs. If the ovipositing female be captured, held by the fore wings, leaving the hind wings free, and "dipped" by hand to the surface of clean water in a vial or a tumbler, an abundance of eggs will usually be liberated. Eggs of those species which possess an ovipositor and which place them within the tissues of plants may be obtained by collecting the stems in which they have been inserted.

Eggs and nymphs should be dropped in boiling water for a minute and then preserved in alcohol. Imagoes, if mounted, should have a wire or bristle inserted into the body its entire length to prevent otherwise

certain breakage, or if placed unmounted in envelopes, these should be of soft paper, loosely packed, so that the eyes will not be crushed.

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I. Imago.

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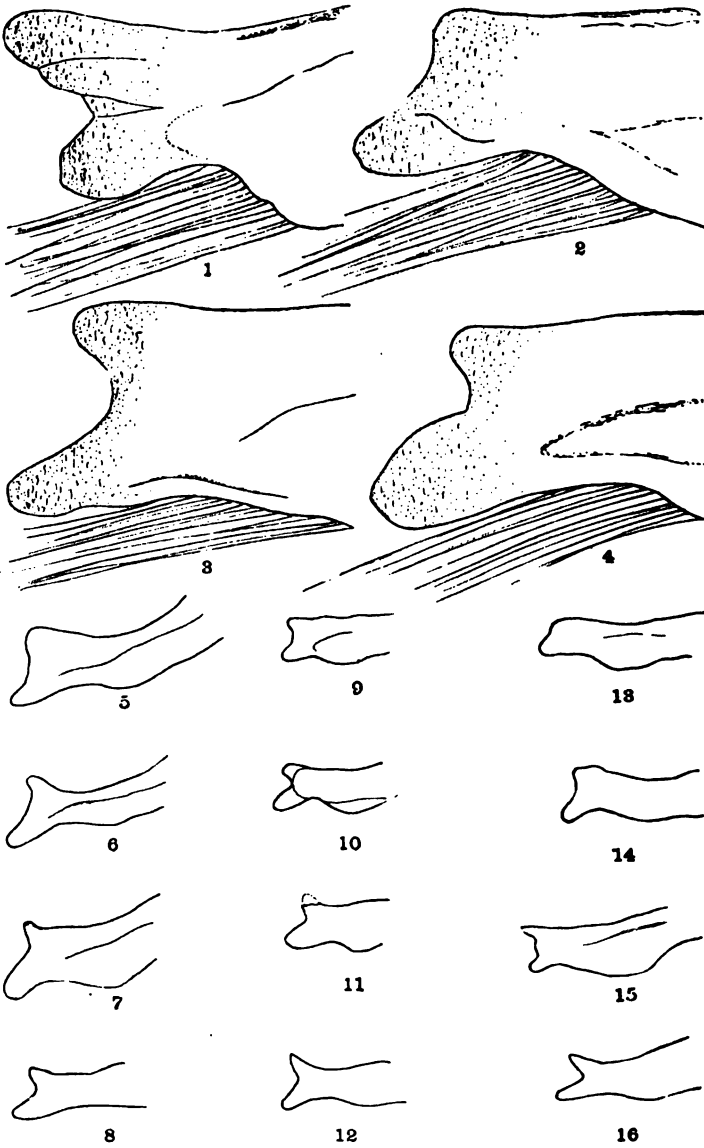
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GENITALIA OF CALLIMORPHA.

The Canadian Entomologist.

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No. 5.

CALLIMORPHA AGAIN.

Larva of Haploa fulvicosta and notes on the male genitalia.

BY HARRISON G. DYAR, PH. D., NEW YORK.

The difficulty of defining species in this genus is increased by the constancy of the local forms or races. I have elsewhere referred (*Ent. News*, VII., 218) to the race of *fulvicosta* which Mr. O. D. Foulks has discovered at Stockton, Md. Mr. Foulks was so kind as to send me over 100 hibernated larvæ, from which I bred a long series of moths: The type form is large, the size of *reversa* and *colona*, both wings immaculate yellowish-white, head, collar and the tips of the abdominal rings ochre-yellow.

In *var. A* the fore wings are nearly pure white, the hind wings much yellower, suggesting *conscita*, though never so dark as that form.

In *var. B* the ground of fore wings is white, marked faintly with ochreous bands in which the full pattern of *colona* can be traced; the costa is narrowly brown-black; the hind wings are pale ochreous. This looks like a washed-out *colona*, related to it in the same way as *var. A*. is to *conscita*.

Var. C is only slightly yellowish on both wings, the hind wings scarcely at all darker; fore wings marked with various streaks and spots of brown-black, especially along the costa and margins, all more or less distinctly connected by ochreous shades, in which the full pattern of *reversa* can be read. This is a washed-out *reversa*, stained with the creamy yellow so characteristic of the Maryland race.

All these forms insensibly intergrade. I believe that this is practically the extent of variation in this Maryland race. There are no specimens that are true *colona*, *conscita* or *reversa*, but these forms are all strongly suggested. The view naturally presents itself that these names apply to local races rather than to distinct species. In his work on Callimorpha (*Proc. U. S. Nat. Mus.*, 1887, p. 338) Prof. J. B. Smith describes the genitalia of *colona*, *Lecontei*, *contigua*, *reversa* and *vestalis*. The differences shown are at best slight, and Prof. Smith assumes the

forms which he figures to be constant. In fact, they are not so. I have drawn the right side pieces of four males of the Maryland race of *fulvicosta*. They are shown in figures 1 to 4, viewed from within $\times 50$, the dorsal angles down. These are not specimens selected for their variation, but are all that were mounted. The only selection applied was in taking the poorest specimens for dissection. Fig. 1 shows the upper angle produced and rounded, the lower angle much more produced; fig. 2 shows the lower angle not produced, but simply rounded; fig. 3 both angles produced, the upper the most so; fig. 4 both angles produced, but the lobes of quite different shapes. There is as much variation in these specimens of *fulvicosta* as in all of Prof. Smith's "species," and I am of the opinion that the genitalia are valueless as a means of specific distinction in *Haploa*. However, I add drawings of most of the other forms and also reproduce Prof. Smith's figures.

It is possible that the larvæ, when fully known, will be of more help, yet this is doubtful, as they seem to possess all the same habits and hence are not markedly different in their colours. Very full descriptions are needed, especially of the mature larva, to test these points. The following observations were made on the larvæ sent by Mr. Foulks and on the young ones bred out of the eggs from the moths.

Normal number of stages six; hibernation in the fourth or fifth. The young larvæ that were selected for observation passed two interpolated stages between the normal II. and III. and died before reaching stage IV.

Egg.—Of the shape of two-thirds of a sphere, scarcely conoidal, the base flat; smooth, shining, rather dark yellow; diameter .6 mm. Reticulations obscure, visible in a strong reflected light, very narrow, linear, irregularly hexagonal, the cell areas flat, uniform, no shadows.

Stage I.—Head high, bilobed, the lobes blackish brown, clypeus pale, mouth brown; width .3 mm. Body pale yellowish, tubercles dusky pearly; hair short, stiff, white. Setæ single, normal, no subprimaries; feet pale. The larvæ grow considerably, becoming long and slender, the tubercles surrounded narrowly by brown.

Stage II.—Head black, shining, clypeus whitish, jaws brown; width .45 mm. Body whitish, warts rather small and with the shields deep shining black; hairs not numerous, but forming true warts, short, bristly, black. A wide space between tubercles i. suggests a dorsal band. Warts each narrowly edged with brown, most distinctly subdorsally, no connected marks. Subventral hairs pale.

Stage III. (interpolated)—Head shining black, clypeus and mouth brown; width .55 mm. Warts large, black, hairs short, bristly, black and white. Body elongated, broadly whitish between warts ii., fading to smoky black in the region of wart iii.; below this another pale band, marked with yellow, transversely annulated streaks behind wart iv., two on each segment; subventral region shaded with brown. Leg plates black. Later the appearance is more as in the next stage, though the bands are not really defined.

Stage IV. (interpolated)—Head black; width .65 mm. Body black, a broad diffuse dorsal gray line, joining a narrower subdorsal one. Region of warts iii. and iv. yellow spotted, joining a substigmatal gray band and subventral gray marks. Warts black; hair short.

Stage V. (normal III.)—Black; head .75 mm. Pale whitish dorsal, subdorsal and substigmatal lines, the subdorsal faintest; bright yellow superstigmatal line, not perceptibly joined to the substigmatal one. Warts black.

Normal Stage V. (from Mr. Foulks; after hibernation)—Head shining black; width 1.7 mm. Body black; dorsal line broad, subdorsal faint, stigmatal broad, substigmatal fainter, yellow, traces of a line subventrally, all more or less white spotted. Essentially as in the next stage.

Stage VI.—Head and warts shining black, the latter bluish; width 2.7 mm. Body deep black, the dorsal line broad, straight, narrowly broken in the incisures and centre of the segments, yellow, darker yellow or red in the centre of each segment, faint on joint 2. Traces of a subdorsal band, broken by wart ii., whitish, mottled. Lateral band broad, indented by warts iii. and iv., broken into three or four spots on each segment by transverse black lines, yellow, irregularly stained with darker yellow, connected inferiorly by mottlings and dots with a narrow substigmatal line which is yellow, mottled, broken and runs between warts iv. and v. Traces of a subventral line between warts v. and vi. on the base of each leg. Leg plates black. Venter broadly pale gray, blackish dotted. Hair very short, inconspicuous, black or black and white, stiff, pointed, not barbed. In some individuals the subdorsal whitish dots are absent, and in some the dorsal band is distinctly marked with red; otherwise there is very little variation. Corresponds well with Saunders's description of *reversa* (CAN. ENT., I., 20), and also with Riley's of *fulvicosta* (Third Report Ins. Mo., 134). The forms *colona* and *conscita* have not been bred.

Explanation of Plate iv.

- Figs. 1 to 4.—Side pieces of male genitalia of *Haploa fulvicosta* seen from within; four examples, specimens from Maryland.
Fig. 5.—The same, *H. clymene*, specimen from Kansas.
Fig. 6.—The same, *H. reversa*, specimen from Texas.
Fig. 7.—The same, *H. colona*, specimen from Texas.
Fig. 8.—Copied from Smith's figure of *H. colona*.
Fig. 9.—Side piece of male *H. lecontei*, var. *militaris*, specimen from Iowa.
Fig. 10.—Copied from Smith's figure of *militaris*.
Fig. 11.—Side piece of *H. vestalis*, specimen from Iowa.
Fig. 12.—Copied from Smith's figure of *vestalis*.
Fig. 13.—Side piece of *H. confusa*, specimen from Northern New York.
Fig. 14.—Copied from Smith's figure labelled *confusa* on the plate, but described as *reversa* in the text.
Fig. 15.—Side piece of *H. contigua*, specimen from New York.
Fig. 16.—Copied from Smith's figure of *contigua*.

SOME ANTS AND MYRMECOPHILOUS INSECTS FROM TORONTO.

BY GEO. B. KING, LAWRENCE, MASS.

During the summer of 1896 I received specimens of ants collected by Mr. R. J. Crew, of Toronto, in exchange for such Coleoptera as I could find for him in my locality. He writes me that he noticed no insects with the ants other than the Coleoptera and some aphids in a nest of ants, but did not capture any.

I have found, however, upon looking them over, they contain several very interesting species of various orders: some truly myrmecophilous, some occasional, while others were brought into the nests by the ants, to be used by them for food; this will apply to a number of Hemiptera collected by *Formica subsericea*, Say.

It may appear to some who are collecting ants'-nests Coleoptera only that the finding of *Agonoderus pallipes*, Fabr., and *Otiiorhynchus oratus*, L., is merely occasional. The position in which these Coleoptera are found with the ants here in Massachusetts, and the frequently finding them with various species of ants, lead me to believe that they are more than incidental or casual visitors.

I am not familiar with the scattered literature treating upon the

Formicidæ found in Canada. I will give, however, all that I know of, taken from Dr. Dalla Torre's Catalogue of Hymenoptera, Vol. vii., 1891 :

Stigmatomma binodosum, Prov.

Pogonomyrmex badius, Latr.

Leptothorax Canadensis, Prov.

Dolichoderus borealis, Prov.

Dolichoderus obliteratus, Scudd.

Formica arcana, Scudd.

Mr. Crew has not as yet found any of the above species at Toronto. The following is a list of those found by him :

Tribe CAMPONOTIDÆ.

Camponotus ligniperdus, Latr., var. *pictus*, For.

" *herculeus*, L., sub-sp. *pennsylvanicus*, Deg.

" *marginatus*, Latr., var. *nearcticus*, Em.

Formica rufa, L., sub-sp. *integra*, Nyl.

" *exsectoides*, For.

" *pallide-fulva*, Latr., sub-sp. *Schaufussii*, Mayr.

" *pallide-fulva*, Latr., sub-sp. *nitidiventris*, Em.

" *fusca*, L., var. *subsericea*, Say.

" *lasioides*, Em., var. *picea*, Em.

Lasius niger, L., var. *americanus*, Em.

" *niger*, L., var. *neoniger*, Em.

" *flavus*, De G., sub-sp. *myopes*, For.

" *claviger*, Rog.

Tribe DOLICHODERIDÆ.

Tapinoma sessile, Say.

Dolichoderus plagiatus, Mayr.

" *Taschenbergi*, Mayr.

Tribe PONERIDÆ.

Ponera coarctata, Latr., sub-sp. *pennsylvanica*, Buckl.

Tribe DORYLIDÆ.

Solenopsis molesta, Say.

Myrmica scabrinodis, Nyl., var. *sobuleta*, Meinest.

" *scabrinodis*, Nyl., var. *Schencki*, Em.

Cremastogaster lineolata, Say.

The following are the miscellaneous insects found with Mr. Crew's collection of ants sent me.

Coleoptera.

CARABIDÆ.

Stenolophus conjunctus, Lec.—With *Myrmica scabrinodis*, Nyl., var. Schencki, Em.

Agonoderus pallipes, Fabr. — With *Myrmica scabrinodis*, Nyl., var. Schencki, Em.

OTIORHYNCHIDÆ.

Otiorthynchus ovatus, L.—With *Formica fusca*, L., var. *subsericea*, Say.

I have found this species in Massachusetts with :

Formica fusca, L., var. *subsericea*, Say ;

Aphaenogaster fulva, Rog.; and

Lasius americanus, Em.

STAPHYLINIDÆ.

Scopæus exiguus, Er.—With *Formica fusca*, L., var. *subsericea*, Say.

Aleocharini g. et sp.—With *Solenopsis molesta*, Say.

PSELAPHIDÆ.

Ctenistes piceus, Lec.

SCYDMÆNIDÆ.

Scydmenus bicolor, Lec.

These two last species were collected by Mr. Crew in company with ants ; but he did not at the time of capture deem it important to save any, so we cannot give the names of the ants. *C. piceus* was found March 23, 1895, and *S. bicolor*, Dec. 4, 1895.

Hymenoptera.

PROCTOTRYPIDÆ.

Proctotrypes californicus, Holmgr.—With *Formica fusca*, L., var. *subsericea*, Say. This, with a few other species of my own finding, are in the collection of the National Museum at Washington, by request of Prof. Howard.

ANDRENIDÆ.

♀ *Halictus confusus*, Smith.—With *Formica fusca*, L., var. *subsericea*, Say.

CYNIPIDÆ.

♀ *Figitodes 5-lineatus*, Say.—With *Tapinoma sessile*, Say.

I have found *Aphaenogaster fulva*, Rog.; *Lasius flavus*, L., and *Lasius americanus*, Em., to collect oak galls late in the fall. Two individuals came out of one lot of galls collected by L. flavus, L., in about two weeks after I collected them, and have been determined by Mr. Ashmead as *Periclistus piratus*, O. S. The ants lap the galls.

Diptera.

STRATIOMYDÆ.

Nemotelus globus, Low.—With *Tapinoma sessile*, Say.

MUSCIDÆ.

Ochthiophoja polystigma, Meigen.—With *Tapinoma sessile*, Say.

Hemiptera.

CICADIDÆ.

Nymph of *Tettigonia*, sp. — With *Myrmica scabrinodis*, Nyl., var. *Schencki*, Em.

NABIDÆ.

Larva of *Coriscus*, probably *ferus*. — With *Formica fusca*, L., var. *subsericea*, Say.

LYGÆIDÆ.

Nysius thysus, Wolff.—With *Formica fusca*, L., var. *subsericea*, Say.

CAPSIDÆ.

Miris affinis.—With *Formica fusca*, L., var. *subsericea*, Say.

THRIPIDÆ.

A handsome species of *Thrips*.—With *Camponotus nearcticus*, Em.

ARANEINA.

Furolithus, sp.—With *Tapinoma sessile*, Say.

Quite a large quantity of a yellow seed unknown to me came in a mixed lot of ants in one vial. Mr. Crew states that he does not remember mixing any of the species found, but put each colony into separate vials. The following are the species from one vial, that contained the seeds :

Formica pallide-fulva, Latr., sub-sp. *nitidiventris*, Em.

Formica fusca, L., var. *subsericea*, Say.

Formica lasioides, Em., var. *picea*, Em.

Myrmica scabrinodis, Nyl., var. *Schencki*, Em.

The last species seemed to predominate greatly in numbers. So far as I know, this is the first time that any of the species here mentioned have been listed as being found in company with ants. In the determination of these insects I have received valuable assistance from Prof. Herbert Osborn, Prof. L. O. Howard, Mr. Ashmead, Mr. Coquillett, and Mr. Blanchard ; and not only for these, but for many others not yet published that I have found to inhabit ants' nests in Massachusetts.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

We have great pleasure in announcing that a branch of our Society has recently been formed in the City of Quebec, with the following officers: President—Rev. T. W. Fyles, F. L. S., Professor of Biology in Morrin College.

Vice-President—Miss Macdonald, Principal of the Girls' High School.
Secretary-Treasurer—Col. Crawford Lindsay.

Council—Messrs. D. H. Gregg, Richard Turner, J. E. Treffry, Miss Bickell, Miss Winfield.

With such an enthusiastic and experienced entomologist as the President, and such an able corps of officers, the Branch will no doubt do excellent work, and serve to unite together all those interested in this department of natural science in the neighbourhood of Quebec. We trust that the new Branch may have a long and useful career.

The Toronto Branch of the Society held its first annual meeting on Friday, April 2nd, in its room, 451 Parliament street. The election of officers for the ensuing year resulted as follows:

President—Mr. E. V. Rippon.

Vice-President—Mr. R. J. Crew.

Secretary-Treasurer—Mr. Arthur Gibson.

Librarian-Curator—Mr. T. G. Priddey.

Council—Messrs. C. T. Hill and C. H. Tyriss.

The reports of the Secretary-Treasurer and the Librarian-Curator for the past year were read and adopted. They stated that twenty-four regular meetings had been held, at which papers relating to the study of insects were contributed by the members. The number of volumes in the library, including bulletins, pamphlets, etc., is 98, all relating to entomology, and all gifts to the Society. A fair collection of insects has already been formed through the kindness of members in presenting specimens, and will no doubt be largely increased during the coming season. The finances of the Society were shown by the Treasurer's report to be in a satisfactory condition.

The President, in his address, congratulated the members on the good work done during the year, and on the success which had attended the Society's operations. He hoped that during the coming season each member would take a special interest in some particular species of insect, and would endeavour to work out its life history; he also trusted that much attention would be paid to the study of those species which are beneficial or injurious to mankind.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXIII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(Continued.)

TETROPIUM, Kirby.

This genus is easily recognized among its neighbours by the fact that the eyes are divided by a deep emargination into an upper and a lower portion, these parts being connected only by a narrow band from which the granulations or lenses have been lost. The Canadian *T. cinnamopterum*, Kirby, is brown, the wing-covers often much lighter than the head and thorax; the entire body is pubescent. Length .50-.70 inch. The head and thorax are slightly shining, distinctly punctured, the punctures regular, usually close but distinctly separated. Elytra opaque or extremely feebly shining. Sculpture much finer than that of the prothorax. The sexes differ especially in the somewhat shorter antennæ and the broader and more strongly rounded prothorax of the female. The species occurs on or under bark of pine logs.

ASEMUM, Esch.

Two species are recorded from Canada. They are stout brown insects with short antennæ (from about one-third to one-half the length of the body), elytra sometimes yellowish. The thorax is about as broad, in its widest part, as the base of the elytra; the punctuation coarse and close on the pronotum, much finer on the wing-covers. The principal differences separating the two forms must be looked for in the prothorax, which is rounded on the sides in *mæstum*, Hald., and distinctly angulated near the base in *atrum*, Esch. The distinctness of the elytral costæ seems an evanescent character, since certain specimens of the former species approach the latter very closely in that respect. In length *A. mæstum* (fig. 16) ranges from .45 to .60 inch, while specimens of *atrum* are known which slightly exceed the greater measurement and others which scarcely reach the lesser. In the larval stage *A. mæstum* is known to infest pine and spruce, and the beetles may be found on lumber piles.



FIG. 16.

CRIOCEPHALUS, Muls.

Contains larger species than the preceding genus, with coarsely granulated eyes which are not hairy. The prothorax is variably sculptured, sometimes roughened and with deep impressions on the disk.

Two are recorded from our region. They are both rather elongate brown insects and separate thus :

Thoracic impressions deep, elytra finely punctured, third joint of hind tarsi two-thirds longer than wide, emarginate for about one-half its length. Sides of prothorax rounded, somewhat roughened. .90-1.10 in. *agrestis*, Kirby.

Thoracic impressions fainter, elytra coarsely punctured, third joint of hind tarsi about as long as wide, cleft nearly to the base. Prothorax very finely punctured, sides rounded, hardly roughened. .94 in. *obsoletus*, Rand.

These insects are found about lumber piles in the northern and mountain regions of North America. *C. agrestis* is known to depredate on pine and spruce.

PHYSOCNEMUM, Hald.

P. brevilineum, Say, is .50-.75 inch long, black, somewhat shining, elytra sometimes bluish or with a faint reddish tinge along the suture. The upper surface is uneven, the prothorax with deep median longitudinal impression which is convex at bottom and limited on each side by an elevation, which is smoother than the external thoracic margin. Elytra distinctly closely punctured and ornamented with a few narrow, short, raised white lines; the median region on each wing-cover is depressed and limited exteriorly by a smoother linear area, which extends from the humerus towards the apex. Thighs suddenly and strongly dilated near their tips. Hind legs very long. The larva is known as an elm borer.

RHOPALOPUS, Muls.

An easily recognized species, *R. sanguinicollis*, Horn, belongs here. It has been found on cherry trees. Length .62-.75 inch, colour black opaque, surface granulate; prothorax red, tips of elytra sometimes brownish. The thighs are less suddenly clavate than in *Physocnemum*, and the tibiae are stouter. The extreme shortness of the prothorax will separate it easily from most of its neighbours.

GONOCALLUS, Lec.

Differs from the adjoining genera by the slender thighs. *G. collaris*, Kirby, is black, shining, elytra sometimes with metallic lustre or clouded with fuscous, the prothorax red, legs sometimes reddish. The upper surface is punctate, the antennae very slender. Length .35-.47 inch.

PHYMATODES, Muls.

Contains a number of species, all of rather small size and usually bright colour. The prothorax is rounded, usually sparsely punctured and shining. Elytral punctuation distinct, often rather coarse, surface usually shining. The following arrangement of species is taken from Mr. Leng's synopsis:

A. Elytra without narrow cross-bands.

b. Thorax dark, elytra of lighter shade before the middle.
.35-.50 in. *dimidiatus*, Kby.

bb. Thorax rufous with broad black stripe. .25 in. *maculicollis*, Lec.

bbb. Thorax yellowish; surface metallic.

c. Larger species, .50-.52 in., elytra and legs yellow, more or less marked with blue. *variabilis*, Linn.

cc. Smaller species.

Elytra blue, antennæ dark. .20-.32 in. *amœnus*, Say.

Elytra piceous, thorax with more or less distinct dark lateral blotches. .34-.36 in. *thoracicus*, Muls.

AA. Elytra with two narrow white or yellowish cross-bands.

Usually rufous, elytra dark, except at base. .25-.36 in. (Fig. 17.) *varius*, Fab.

These insects are usually to be met with in beating.

P. variabilis has been recorded as depredating on oaks, while *amœnus* bores in grapevines. *P. varius* is believed to live as a larva in black oak, but I know of no breeding record.



Fig. 17.

CALLIDIUM, Fabr.

Two of the species are metallic green or blue, the other is brown or yellowish. They are mostly flatter than *Phymatodes*, and with heavier antennæ, especially in the male. The colour affords a primary means of separating them, *C. æreum*, Newm., being entirely testaceous or brownish, while *antennatum*, Newm., and *janthinum*, Lec., are metallic blue or green above. The last named has the thorax deeply punctured, not impressed, while in *antennatum* impressions are present and the thoracic punctuation is finer. All the species vary much in size, *æreum* from .34 to .50 inch, while the others run from .25 to .55 inch, *janthinum* averaging a little smaller. It is reported *æreum* has been bred from chestnut, while *antennatum* depredates on pine.

HYLOTROPES, Serv.

The two species of this genus are very different in appearance. *H. bajulus*, Linn., is blackish, pubescent above, more thickly on the prothorax, where the hair is whitish, almost covering the surface except on the elevated median line and the two raised callosities, which are thus rendered very conspicuous. The elytra have two indistinct transverse fasciæ of whitish pubescence, one in front of the other behind the middle, the latter sometimes wanting. Length, .72 to .88 in. Depredates in pine and juniper. *H. ligneus*, Fabr., is extremely variable, the thorax usually black, less hairy than in *bajulus*, and with five callosities. Elytra yellowish or reddish, with a large blackish blotch occupying usually the apical third, and an elliptical spot of the same colour but varying in size between this blotch and the base. Bores in juniper in the larval state, perhaps also in pine, as the beetle is found on piles of lumber or on freshly constructed fences. Length, .30 to .45 inch.

MERIUM, Kirby.

M. proteus, Kirby, is .45 to .60 inch long, thorax metallic blue or violaceous, shorter than usual, varying in shape according to sex, densely punctured and rather opaque at sides, but shining and with only a few large punctures at middle. Elytra usually greenish metallic, densely and coarsely punctured, generally with two raised longitudinal yellowish lines before the middle, the side margin also yellowish in some specimens. Thighs reddish yellow, except at base and apex, which, with the tibiæ and tarsi, are blackish. Beneath shining black with a violaceous tint.

CHION, Newm.

Here belongs *Chion cinctus*, Drury, a large beetle of a brownish colour (fig. 18), sparsely clothed with whitish pubescence, each elytron usually with an oblique blotch of a yellowish colour near the base. The prothorax is nearly round, and bears a small spine on each side. The elytra are each bispinose at tip. The male antennæ greatly exceed the body in length. The species reaches a size of from .75 to 1.5 inch. It is known to breed in hickory. The name *garganicus*, Fabr., catalogued as a variety, refers to the spotted form.

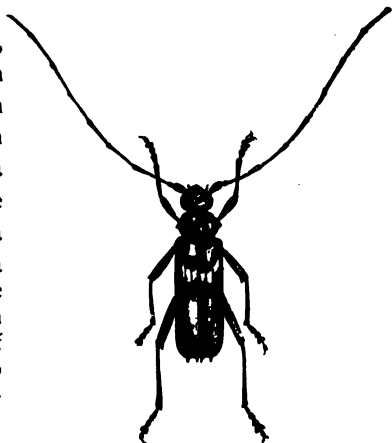


FIG. 18 (after Harris).

EBURIA, Serv.

The two pairs of raised white spots (looking like Ichneumon eggs) on each elytron will easily serve to distinguish this genus. The only Canadian species is *E. quadrigeminata*, Say, which is of a yellowish colour, the thorax with sharp lateral spine and two distinct discal callosities. The elytra are bispinose at apex, the middle and hind femora have each two long spines at tip. The ivory spots of the elytra are situated on the costæ, the outer one of each pair being the larger, this difference in size being much better marked in the posterior pair. Length, .90-1.20 inch. Breeds in hickory, ash, and honey locust.

ROMALEUM, White.

Contains two large species, among the most bulky of the Canadian Longhorns. Both are pubescent insects of robust build, the prothorax rounded at sides and without lateral spine, the elytra spinose at apex, tip of thighs unarmed, antennæ spinose internally. *R. rufulum*, Hald., is fulvous with uniform pubescence of the same colour. Length, .88-1.15 in. *R. atomarium* is darker, brownish, with irregularly mottled pubescence, and reaches a slightly larger size. It has been found under bark of walnut, while the larva has been bred up on hackberry.

ELAPHIDION, Serv.

The Canadian species of this genus are smaller and less robust than the preceding, and may be distinguished therefrom by that character alone. *E. villosum* is the well-known oak-pruner, and does, at times, considerable damage by ovipositing in twigs of oak trees, the larvæ then eating out the inner portion, so that the twig becomes weakened and may be blown off in a strong wind. Its depredations are not confined to oak, however, as Mr. Chittenden has recorded many other food plants. The table of species is an adaptation of the characters presented by Mr. Leng:

- A. Antennal spines large, thighs spinose at tip, body above with irregular vestiture of gray pubescence. .60-.75 inch.
- AA. Antennal spines small.
 - b. Above clothed with mottled gray pubescence, elytra bispinose at tip.
 - c. Sides of prothorax rounded. .70.....*incertum*, Newm.
 - cc. Sides of prothorax hardly rounded; nearly cylindrical.
 - Prothorax scarcely longer than wide. .70 in. *villosum*, Fabr.
 - Prothorax distinctly longer than wide. .70 in*paralleum*, Newm.

- bb. Above nearly glabrous, shining testaceous. Form very elongate, elytral spines long. .43-.45 in. *unicolor*, Rand.



FIG. 19.



FIG. 20.



FIG. 21.

It is stated that *E. villosum* and *E. parallelum* are not distinct, but they are included in the above table, as their amalgamation has not yet been generally accepted. The figures 19, 20 and 21 represent the three stages of *E. villosum*.

TYLONOTUS, Hald.

Represented by *T. bimaculatus*, Hald.; of a brownish colour. .45 to .60 in. long. Each elytron with two rather large, somewhat rounded yellowish spots, one in front of the middle, the other sub-apical. The thighs are yellowish except at base and apex, rather strongly clubbed. The antennae are bisulcate (more distinctly on the third and fourth joints), the thorax is thickly punctured with smoothish median line and two rather large dorsal callosities. The elytra are coarsely, rather sparsely, punctured. Pubescence thin, yellowish. The larva bores in ash; beetles have been found under bark of the white or paper birch.

HETERACHTHES, Newm.

Easily recognized by the elongate form, shining surface and extremely small second antennal joint. The thighs are strongly clubbed, the antennae long and heavy. *H. quadrimaculatus* is .30 to .45 in. long, brown or testaceous with two paler spots on each elytron, one in front of and one just behind the middle. The pale specimens have the spots indistinct. Head closely, elytra and thorax very sparsely, punctured. Length, .30 to .45 inch. It has been bred from hickory limbs.

GRACILIA, Serv.

G. minuta, Fabr., does not occur on any of the Canadian lists, but has been described and figured (in the CANADIAN ENTOMOLOGIST, vol. xxiii., p. 102), by Mr. J. F. Hausen. His figure (fig. 22) and description are here reproduced. "It is of a uniform reddish-brown, the legs being somewhat lighter, with rather sparse cinereous pubescence, giving it a heavy appearance. The antennae are ciliate, and the head, thorax and



Fig. 22.

elytra furnished with flying hairs. Rather variable in size, .18-.27 in." It was taken by Mr. Caulfield, emerging from a barrel of some kind of dye. The species is supposed to have been introduced from Europe. It has been bred from white birch.

PHYTON, Newm.

A small pale insect, *P. pallidum*, Say, belongs here, and is perhaps doubtfully a true member of the Canadian fauna. It is a trifle under one-fourth of an inch long, of a yellowish colour, the prothorax broad in front of the middle, but narrowed in front and (much more so) behind, the surface with indefinite darker markings. Elytra with four oblique brownish bands, of which the one just behind the middle is broad, the remainder narrow. I have beaten it from

palmetto blossoms in Louisiana. It has been bred from hickory and from *Cercis canadensis*.

OBRIUM, Serv.

The only Canadian form is *O. rubrum*, Newm., which is one-fourth of an inch in length, shining reddish-testaceous, the head broader than the prothorax, which bears an obtuse dilatation each side near the middle, and has the base and apex nearly equal. The elytra are more closely punctured than the thorax. Thighs strongly clubbed.

NOTES ON PHILÆNUS.

BY CARL F. BAKER, AUBURN, ALABAMA.

Philænus spumarius, L. — From various localities in the New England States I have large series of the typical form of this species, and also specimens representing the well-marked varieties, *leucocephala*, L., and *lineata*, Fabr.

Philænus abjectus, Uhl. — A portion at least of the material recorded under *Lepyronia angulifera* in the Prelim. List Hemip. Colo. belongs to this species. I have taken it at Fort Collins, Colo., and in the adjacent foothills, in May and June. The specimens from this locality are uniformly darker than the type.

Philænus lineatus, L.—I have a large series of this species from the North-eastern U. S., the specimens of which are identical with the typical European form. It seems probable that true *lineatus* is confined to the Eastern U. S. In American publications three distinct species have been confused under this name,—true *lineatus*, the *bilineatus* of Say, and a new species from New England which I shall call *americanus*.

The genus presents two types of elytral venation, one simple and regular, with three or four distinct apical cells, while in the other the elytra are distally irregularly reticulated. *Lineatus*, *spumarius*, *campestris*, *exclamationis*, etc., fall into the first group, while the second group appears to be strictly American, including *abjectus*, *bilineatus* and *americanus*.

Philænus bilineatus, Say.

1831. Say, Journ. Acad. Nat. Sci. Phila. VI., 304 (*Aphrophora bilineata*).

1872. Uhler, List Hem. Colo. and N. M., 472 (*Ptyelus lineatus*).

1876. Uhler, List Hem. region west of Miss. R., 347 (*Philænus lineatus*, var. *bilineata*).

1877. Uhler, Rep. on Ins. Coll. in 1875, 458 (*Philænus lineatus*).

1878. Uhler, List Hem. Dak., Ind., Mont., 510 (*P. lineatus*).

1895. Goding, Syn. and Cat. N. A. Cercopidæ (*P. lineatus* in part).

1895. Gillette & Baker, Prelim. List Hem. Colo., p. 70 (*P. lineatus*).

This is the very common western species, heretofore referred to *lineatus*. Say's colour description is a very good one. It is a larger, more robust species than *lineatus*, with the elytra broader in proportion to the width. The face is very much more strongly convex as viewed from the side than in *lineatus*. There are also other minor differences.

I have specimens of a small male variety from Northern Colorado in which the head and thorax are darker, and the elytra, except the usual costal markings, black.

Philænus americanus, n. sp.

Resembling *bilineatus* in size and form as viewed from above. It has the flatter face of *lineatus*, which it resembles very closely in colour. It, however, differs very markedly in the elytral venation, which is very weak and distally broken up into irregular reticulations. The vertex is longer in proportion to length of pronotum than in *lineatus*. Length, 6 mm.

I have before me nine specimens, all very uniform in characters, sent by Prof. A. P. Morse, of Wellesley College, from the following localities: Dover, Mass., June 26; Wellesley, Mass., Aug. 8; Thompson, Conn., Aug. 4.

TWO NEW PARASITES FROM EUPOEYA SLOSSONIAE.

BY WILLIAM H. ASHMEAD, WASHINGTON, D. C.

The two new hymenopterous parasites described below were bred by Dr. Harrison G. Dyar, from the larva and cocoons of *Eupoeya Slossoniae*.

PELECYSTOMA, Wesmæl.

Pelecystoma eupoeysia, n. sp.

♀.—Length, 4.5 mm. Head, thorax and abdomen above brownish-yellow; collar above, the middle mesothoracic lobe anteriorly, the lateral lobes and the metathorax, fuscous or blackish; head beneath mouth parts, pronotum, thorax at sides and beneath, tegulae, legs and venter, white; the tarsi more or less and the femora toward apex with a decided yellowish tinge; stemmaticum dusky, the ocelli pale; occiput with two dusky spots. Antennae 48-jointed, slender, much longer than the body, the scape and pedicel somewhat dusky, the flagellum pale brownish-yellow. Mesonotum smooth, trilobed, the metanotum shagreened. Wings hyaline; the costa, stigma, poststigmatal and basal veins pale yellowish, the other veins dusky; second abscissa of radius about three times as long as the first, the second submarginal cell, therefore, long, longer than the first and almost as long as the third. Abdomen as long or possibly a little longer than the head and thorax united. Segments 1-3 coarsely longitudinally striated, the following almost smooth, but opaque; the first segment is scarcely as long as the second and third united, the third about half the length of the second, the fourth and following shorter, subequal; ovipositor distinctly exerted, scarcely as long as the basal joint of hind tarsi, the tip black. Type, No. 3648, U. S. N. M.

Described from a single female specimen.

CRYPTURUS, Gravenhorst.

Crypturus Dyari, n. sp.

♀.—Length, 6.5 to 8.5 mm. Head and thorax marked with white, the abdomen black banded with white; antennae with a broad white annulus; palpi and legs fulvous. Antennae 29-30-jointed, black; the apex of joint 6, joints 7-11 entirely, and base of 12th joint, white. Clypeus, a spot above, spot on cheeks, anterior orbits extending to back of eyes, collar above, large spot just before the hind angles of pronotum, two abbreviated median lines on mesonotum, spots on mesonotum ridges that extend to scutellum, the scutellum, the postscutellum, the tegulae, a spot

beneath, a large spot on mesopleura just above the mesosternal suture, spot at base of hind wings, the blunt but prominent metathoracic tubercles and rather broad bands at apex of all abdominal segments, white. Head sparsely punctate; thorax punctate, the mesonotum medially somewhat rugoso-punctate, laterally more evenly and less closely punctate, the mesopleura medially with some coarse transverse striæ, just back of which is a smooth polished spot, but above and below closely punctate; metathorax with only the basal transverse carina present and which is sinuate medially, the basal enclosure thus formed finely rugulose, but beyond it the surface is rather coarsely rugose; the white metathoracic tubercles are short, blunt and wider or longer than high. Wings hyaline, the stigma lanceolate, brownish, the other veins black; areolet quadrate in position but open behind. Abdomen shining, but under a strong lens exhibiting a very fine coriaceous punctuation.

♂.—Length, 7 mm. Agrees well with the female, except the face below the antennæ, including the semicircular labrum, is entirely white, the mandibles with a white spot at base, the antennæ entirely black, not ringed with white, 29-jointed, the front coxæ and trochanters whitish, while the hind tibiæ, except near base, their spurs and their tarsi, are black. Type, No. 3649, U. S. N. M.

Described from one male and three female specimens.

The two previous species known in our fauna were described by the writer and from the male sex only. The males of these three species may be tabulated as follows:

A. Head and thorax with rufous markings.

Legs rufous; hind tibiæ, except at base, and their tarsi, black; tibial spurs red (Texas).....(1) *C. texanus*, Ashm.

AA. Head and thorax with white markings.

Legs rufous, the coxæ white with black markings; second joint of hind trochanters, tips of hind femora, apical two-thirds of their tibiæ, black; their tarsi, except extreme base of first joint and more or less of the last joint, which are black, white (Michigan).....(2) *C. albomaculatus*, Ashm.

Legs fulvous, anterior coxæ and trochanters white, hind tibiæ, except at base, their spurs and tarsi, entirely black, their femora not tipped with black.....(3) *C. Dyari*, Ashm.

NOTES ON PREDACEOUS HETEROPTERA, WITH PROF. UHLER'S DESCRIPTION OF TWO SPECIES.

BY A. H. KIRKLAND, ASSISTANT ENTOMOLOGIST TO THE GYPSY MOTH COMMITTEE, AMHERST, MASS.

During the month of May, 1896, while making field observations in Malden and Medford, Mass., upon the insects known to attack the gypsy moth (*Porthetria dispar*), I found that many of the common predaceous bugs upon emerging from hibernation greedily availed themselves of the food supply offered by the tent caterpillar and destroyed large numbers of this insect. *Podisus placidus*, *P. serieiventris*, *P. modestus*, *Dendrocoris humeralis*, *Euschistus fissilis*, *E. tristigmus*, *E. ictericus*, *E. politus* n. sp., *Meneles insertus* and *Diplodus lividus* were often found feeding upon partially grown tent caterpillars. *Podisus placidus* and *P. serieiventris* enter the tents and prey upon the inmates, but the other species generally attacked the larvæ while they were feeding. The species of *Euschistus* are the least predaceous and it is probable that they naturally feed more upon plants than upon insects.

When feeding, these Pentatomids insert the setæ only, and not the sheath, into the body of the caterpillar. I have watched them very carefully under a hand lens and my observations fully agree with those of Mr. Marlatt, as given in the Proceedings of the Entomological Society of Washington, Vol. II., p. 249. I have seen *P. placidus* extend its setæ beyond the end of the beak to a distance equal to the length of the last rostral joint. When the setæ are inserted in a strongly chitinized part the struggles of the larva often pull them from the sheath. In such cases the beak is drawn through the fore tarsi in the same manner that an ant cleans its antennæ, and thus the setæ are forced back into the sheath. I have also removed the setæ of *P. cynicus* from the sheath by means of a fine needle applied along the labrum and have seen them replaced in the same manner.

In the Report of the Massachusetts Board of Agriculture for 1896 I have published, with illustrations, notes on a part of the early stages and habits of some of these Heteroptera and the life history of *P. placidus*. This insect was first brought to the attention of entomologists through some very interesting notes published by Prof. Saunders in the CANADIAN ENTOMOLOGIST, Vol. II., p. 15. The nymphs of this species, at first thought to be *Stiretrus anchovago* (Fab.) (*fimbriatus*, Say), were found attacking the larvæ of the currant sawfly, *Pteronus ribesii* (Scop.). Walsh,

on page 33 of the volume cited, corrects the identification and refers the insect to *Podisus spinosus* or *modestus* or to an allied species. Later specimens sent to Prof. Uhler (not Ulke) were found to represent a new species and were named *Arma placidum* (CAN. ENT., Vol. II., p. 93). Prof. Saunders also gives notes upon the predatory habits of this insect in the Report of the Entomological Society of Ontario, 1871, p. 31.

I have been unable to find the original description of the species. Through correspondence with Prof. Uhler I learn that he cannot recall the circumstances connected with the publication of the description, were such a description published, and he has very kindly sent me the following characterization of the species together with a description of *Euschistus politus*:

Podisus placidus, Uhler.—“Of a narrower and more oval form than *P. serieiventris*, with a head somewhat tapering anteriorly, and rounded at tip instead of being truncated, and with the humeral angles rounded off and very moderately prominent. Colour pale testaceous, stained with pale brown and punctate with darker brown. Head much longer than wide, depressed, remotely punctate, the edge reflexed, brown; each side of tylus is a slender brown line which is triangularly expanded on the base of the vertex; occipital margin dark brown in the middle, pale and narrowly callous each side; a pale callous line extends back from each ocellus; throat whitish testaceous; cheeks with a slender black line before each eye; eyes brown, bordered with testaceous behind; antennæ pale brown, paler at base and on the last two joints; the basal joint testaceous, very short, the second longest, third scarcely more than half the length of the second, fourth about three-fourths as long as the second, fifth a little shorter than the fourth; rostrum stout, pale testaceous, reaching upon the posterior coxæ, the apical joint narrow, about as long as the preceding one, brown. Pronotum with the sides straighter than usual, the lateral margin narrowly callous, pale ivory-yellow, and with a few indented points and small teeth before the middle; the submargin with a brown line, surface with wavy, transverse pale lines between the pale brown marbling, more generally brown behind the middle; post-humeral margins slightly sinuated; anterior margins callous, having a small group of coarse punctures behind each eye; punctures sunken, brown, mostly not close together in the transverse series; posterior margin truncate. Scutellum long, bluntly rounded and margined with white at tip, punctures in short transverse series, grouped in about three.

spots at base. Corium slenderly bordered with pale testaceous, more broadly covered with brown at base and on the disk, the veins posteriorly yellow; membrane pale bronze. Legs minutely speckled with red, the tibiae and tarsi a little stained with brown. Under side finely punctate, the sternum with two series of black points. Connexivum depressed, punctate, the outer edge ivory white, callous and marked with two black points at each incisure of the segments; the upper surface yellow, with the black points more linear. Length to end of abdomen, $8\frac{1}{2}$ to $10\frac{1}{2}$ mm. Width of pronotum, $4\frac{2}{3}$ to 6 mm.

"Through the kindness of many friends I have had an opportunity to examine specimens from the Provinces of Quebec, Ontario, and Columbia, in British America; from nearly all of the New England States, besides Illinois, Iowa, Michigan, and Colorado. The genital segment of the male is deeply excavated, and with two short processes on the middle. The tergum is often bright red, which colour becomes brownish in more mature specimens. The humeral angle is usually more or less black. In some specimens there is a series of minute black dots each side of the venter, and a few obscure spots distributed over the ventral surface."

Euschistus politus. New sp.—"Pale dull fulvous, or rufo-fulvous, suboval, with the humeral angles almost rounded and very moderately prominent. Head narrow, as in *E. tristigmus*, Say, deeply and finely punctate, the tylus prominent at tip and a little longer than the lateral lobes, the lateral lobes deeply sinuated, with the outer margin blackish. A black line extends from the eye to base of antennæ; antennæ clay, yellowish; the basal joint short, hardly reaching the apex of head, marked with a few black points; second joint longer; third a little longer than the second; fourth longer, dusky at tip; fifth a little longer than the fourth, fusiform, blackish excepting at base; rostrum pale testaceous, slender, with the setæ piceous, reaching to the posterior coxæ. Pronotum much wider than long, polished, closely and finely punctate with brown; the lateral margins very slightly sinuated, smooth, ivory white; the submargins blackish; humeral angles triangularly rounded; posthumeral margins almost straight. An obsolete, callous, imperfect curved line extends between the humeral angles. Scutellum narrow and bluntly rounded at tip, where it is also slenderly margined with white; the surface is less densely punctate in small spots. Wing-covers closely punctate; membrane a little brownish, the veins and numerous dots darker brown. Legs pale yellow, remotely dotted with brown. Beneath pale greenish,

finely punctate, highly polished, the pleura with a row of fine black dots, and an extra dot outwardly; connexivum acute, the intersegmental sutures indented and marked with a black dot. Tergum black, the sutures, exteriorly, with a double black spot. Length to end of abdomen, 9 to 10 mm. Width of pronotum, $5\frac{1}{2}$ to 6 mm. A pair of these insects taken in Massachusetts have been kindly given to me by Mr. A. H. Kirkland. Other specimens have been sent to me for examination from Rhode Island, Pennsylvania, and the District of Columbia. I have found it once, July 4, in a sandy pine woods district in southern Maryland. Only a few specimens have thus far been reported. It seems to be of rather uncommon occurrence."

GRAPTA INTERROGATIONIS.

BY ARTHUR J. SNYDER, N. EVANSTON, ILL.

Under the title "Notes on Vanessa Interrogationis," in the February number of CAN. ENT., Mr. W. F. Fiske gives some interesting statements corresponding to observations made here. I kept bait for moths on the trees in and near my yard from the beginning of the year 1896, and captured Noctuids during January, February, and March.

Diurnals came to the bait for the first time on April 12th. *Vanessa Antiopa* led the van, followed closely by the *Graptas* and *Pyrameis Atalanta*. In a few days *Interrogationis* and *Atalanta* were abundant. *Grapta Comma* appeared on the 17th of April.

April 24th I made the following note in my record: "Previous to this date all the *Grapta Interrogationis* were hibernating specimens and of the form *Fabricii*. This evening (my observations were made from four p.m. 'till dusk) all were of the dark form *Umbrosa*, but also all old hibernating specimens."

On the 25th both *Umbrosa* and *Fabricii* were seen. During the last of April and first part of May *Graptas* were exceedingly abundant.

On May 7th saw the first *Grapta* depositing eggs on elm. Captured the ♀ and found it to be *Umbrosa*. A single butterfly procured from these eggs was of the form *Umbrosa*.

Soon the eggs and larvæ of *Graptas* were abundant on the elm trees and shrubs, especially on the low branches of young trees. One could hardly turn over a bough of one of these without finding several larvæ.

Mr. Fiske came near proving a point concerning which many of us are interested, but the weak point is this: Did he examine the leaves of the branch of elm on which he netted the ♀ *Umbrosa*? If not, how does he know that there were no eggs upon the limb at the time of confining the ♀ there?

I have frequently found upon the same limb larvæ of *Graptas* in several stages of maturity, small ones just hatched, and others almost ready to pupate.

I am inclined to think that *Umbrosa* and *Fabricii* may be obtained from eggs laid by one ♀, just as Mr. W. H. Edwards has succeeded in raising imagoes of *Papilo Oregonia* and *Bairdii* from eggs laid by a single individual.

To prove these points just as we would have them, both sexes should be reared, each form paired with its kind, and *vice versa*, and the results noted. The second generation of specimens thus observed should settle the question.

While I cannot positively answer Mr. Fiske's question as to where the immense number of *Umbrosa* came from, the observations made here go to prove that the uncommon appearance of the species was not confined to one locality, but the "wave" probably extended over the entire eastern United States. It is my opinion that the preceding autumn was an unusually favorable one for the *Graptas*, for both *Umbrosa* and *Fabricii* were common here in August, 1895.

Grapta Comma was very abundant here in the autumn of 1892, but did not appear in great numbers again until the spring of 1896.

Papilio Ajax is very rare here in ordinary years, but in 1895 suddenly great numbers of badly worn specimens appeared and remained for some days. Every collector captured examples, I think, but hardly any one secured a perfect specimen.

The nearest point at which the food plant of *Ajax* is found, so far as I have been able to ascertain, is on the Michigan side of Lake Michigan. In this case the butterflies may have been carried from their usual haunts by winds.

Insects undoubtedly migrate, sometimes suddenly and in immense numbers, as has been noted of *Danaïd Archippus* and *Callidryas Eubule*, and sometimes slowly, taking years to reach a certain locality hitherto unknown to the species.

Chrysophanus Helloides is moving eastward. A few years ago it

was considered a Rocky Mountain species, but lately specimens have been taken in Iowa, Illinois, and Indiana.

Another question is why the form *Fabricii* should appear before *Umbrosa* and then later on both forms appear at the same time?

The broods of *Interrogationis* seem very irregular as to time of appearance, but there are at least two annual broods here.

A NEW CÆLIOXYIS FROM NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, N. M.

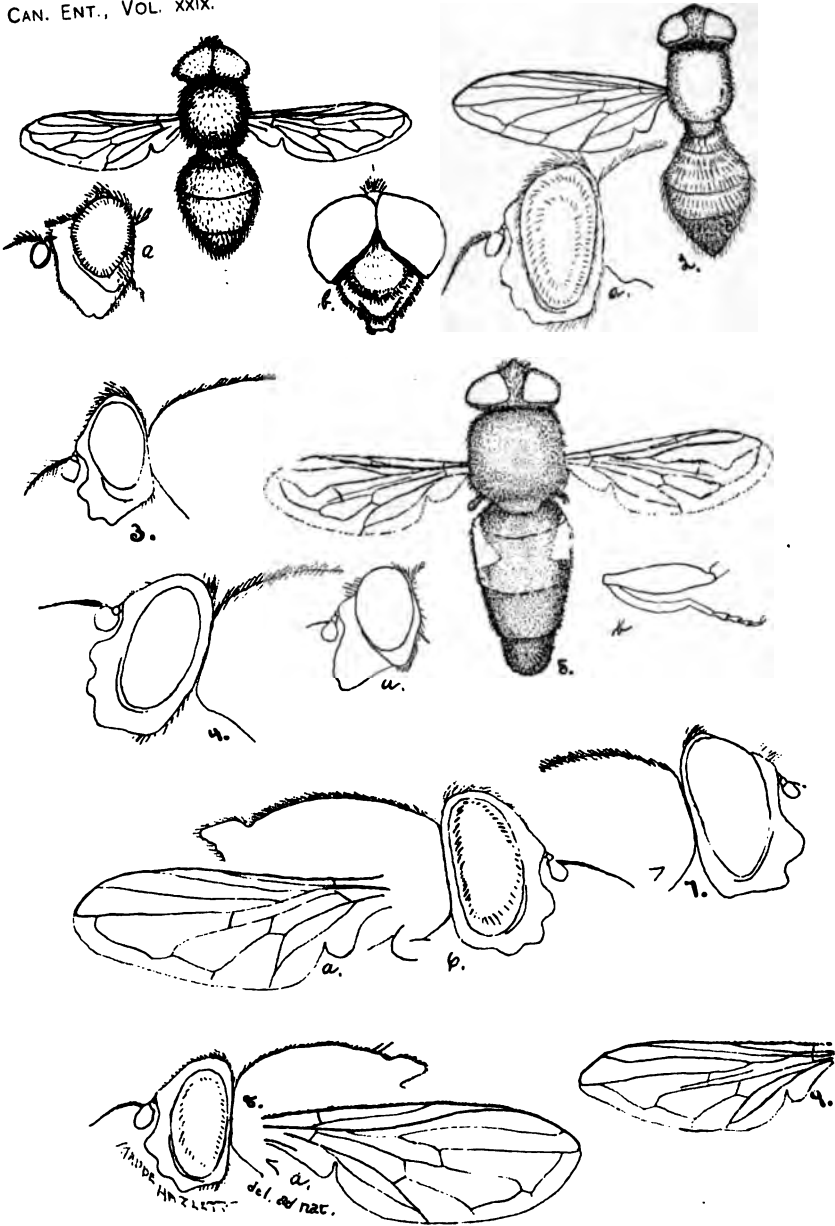
Cælioxyis menthae, n. sp.—♂. Length $9\frac{1}{3}$ mm., black with the legs and base of abdomen ferruginous. Pubescence scanty, dull white, rather dense and tinged with ochraceous on face. Head rather large; vertex shining, with large, well-separated punctures; mandibles bifid at ends, ferruginous except tips and extreme base; antennæ black, flagellum faintly rufescent beneath towards the end; mesothorax shining, with extremely large, well-separated punctures; a band of dull white pubescence at base of scutellum and a patch above base of wings; scutellum shining and sparsely punctured, without any trace of a keel, rounded behind, with a very small tubercle at the middle (representing the median tooth of *aperta*, etc.), lateral teeth large, flattened and rounded at tips; enclosure of metathorax distinct, very finely granular, with a basal series of large pits; tegulæ apricot colour; wings dusky hyaline, the apical margin broadly smoky, nervures piceous, stigma fuscous, marginal cell more produced at tip than in *altilis*; coxæ more or less darkened, legs otherwise entirely bright ferruginous, with the pubescence extremely scanty; abdomen shining, segments 2-5 with transverse sublateral grooves; punctures sparse, largest and densest at sides, rather small and numerous on dorsum of first segment, absent on dorsal middle of segments 2-5, except for an apical row and on 2 an imperfect basal one; sixth segment with sparse minute punctures. Hair-bands very narrow and interrupted dorsally, so as to be inconspicuous. First segment except the extreme base entirely ferruginous; second and third segments, and fourth more or less, ferruginous at sides; venter ferruginous except apex. Apex with six teeth, of the terminal ones the lower are the longer.

Hab.—Denning, N. M., at flowers of garden mint in Mrs. Bristol's garden, July 9, 1896. (Ckll. B. 45.) Very distinct by the sparsely punctured (in parts impunctate) abdomen with its rufous first segment. Nearest, perhaps, to *C. texana*, Cr.

There is a *Cælioxyis* taken by Prof. Townsend on the Gila R. in numbers, which I could not definitely identify. A specimen sent to Mr. Fox comes back marked "near *mesta*." Very possibly the species is new, but I do not at present care to give it a name, as there are several closely allied forms which I have not seen, and it may be one of them.

Mailed May 1st, 1897.





NORTH AMERICAN SYRPHIDAE.

The Canadian Entomologist.

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CONTRIBUTION TO THE KNOWLEDGE OF NORTH AMERICAN SYRPHIDÆ.—II.

BY W. D. HUNTER, INSTRUCTOR IN ENTOMOLOGY, UNIVERSITY
OF NEBRASKA.

Plate V.

An interesting part of this paper will be found to deal with some material from Alaska. During the summer of 1896 Prof. L. L. Dyche, of the University of Kansas, the well-known taxidermist, made an expedition to Cook's Inlet, Alaska, and from there inland. A number of species of Syrphidæ were taken simply as a side issue, the expedition not being an entomological one at all. Unfortunately, during the long journey back many of these specimens were damaged beyond all hope of recognition. The material that came through, however, without damage, although consisting of only thirteen species, makes quite a contribution to the knowledge of the Dipterous fauna of that interesting region. Although some of the orders of insects, notably the Coleoptera, have been quite assiduously collected in Alaska, and extensive reports written upon them, in the Syrphidæ, as is the case in all of the families of Diptera, no collections of importance have been made. The whole of the literature of Dipterology contains the record of only seven species as occurring in Alaska. These are mostly from Loew's Centuries as follows:

Chrysotoxum derivatum, Walker, List, iii., 542 (Yukon River).

Platychirus pelatus, Meigen, Syst. Bschr., iii., 334 (Syrphus). Sitka, Loew.

The authority for this entry is Osten Sacken, Cat. 1872, 122, "Sitka according to Loew." I do not know where this record was made, nor indeed if it was ever made outside of letters.

Sphegina infusca, Loew, Centuries iii., 23 (Sitka, Sahlberg).

Baccha obscuricornis, Loew, Centuries iii., 117 (Sitka, Sahlberg).

Sericomyia chalcopyga, Loew, Cent. iii., 20 (Sitka, Sahlberg).

Eristalis Meigenii, O. S., West. Dipt. 337 (Yukon River).

Xylota barbata, Loew, Cent. v., 40 (Sitka).

Since none of the species taken by Prof. Dyche duplicate those above, the total number of Syrphidæ known from Alaska is brought up to twenty.

These species are included in their systematic relation below. It has been thought best, however, to place them in ensemble form here.

Chilosia gracilis, n. sp.

Chilosia plutonia, n. sp.

Chilosia alaskensis, n. sp.

Melanostoma mellinum, Linn. I have also seen specimens of the species taken at Ft. Wrangel by Prof. Wickham.

Syrphus intrudens, O. S.

Syrphus mentalis, Williston.

Syrphus protritrus, O. S.

Syrphus Lesueurii, Macq.

Syrphus umbellatarum, Schiner.

Eristalis occidentalis, Williston.

Helophilus latifrons, Loew.

Helophilus Dychei, Will.

Xylota ejuncida, Say.

The preponderance of *Chilosia* and *Syrphus* forms which are known to be mountainous is conspicuous; that the three species of the former genus are all new is not surprising considering the state of our knowledge of them in this country. The occurrence of three European species out of the relatively small total number is rather remarkable, and bears out the law of the occurrence of such forms in the West rather than in the East of this country, or at least that where they occur in the East they also occur in the West. That two species of *Helophilus* should be found is entirely as would be expected of such a northern genus; although that one of them should be new, and that in a restricted group of northern forms, which are of almost circumpolar distribution, is noteworthy.

All of this Alaskan material was placed in the form of a rough draft of a paper by Dr. Williston. In a most truly generous spirit he turned the paper with the specimens over to me, advising me to make any changes that I might see fit, and giving me full permission to incorporate it in the present paper. This has been done. The additions of mine are the preceding part, the descriptions of the three new species of *Chilosia*, and several notes.

1. *Microdon viridis*, Townsend, Dipt. Baja, California, in Proc. Cal. Acad. Sci., Series 2, Vol. III., p. 610 (April 8, 1895).

I have received from Prof. Aldrich a single specimen of this characteristic species.

This specimen bears the label "Knoxville, Tenn., 2nd July, '91." In reply to a letter in which I expressed some doubt as to the correctness of this label, Prof. Aldrich has assured me that the specimen was collected by Mr. H. E. Summers in Tennessee and that he has no doubt but that the label is authentic and perfectly correct. The specimen on which Mr. Townsend founded the species was from San José del Cabo Baja, California.

The remoteness of this locality from that of the type was a matter of no little surprise to me and has caused me to make an unusually diligent search of the literature to ascertain whether Mr. Townsend's species might not be the same as some previously described more widely distributed one. I have found, however, that *M. viridis* is entirely unique among the species of *Microdon*, although it approaches *M. devius*, Linn., of Europe.

I found recently in the collection of the Kansas State University another specimen of this species which I have ascertained was taken by Mr. Chas. Robertson at Orlando, Florida, March 16th, 1887.

2. *Microdon megalogaster*, Snow, Kansas Uni. Quart. Vol. I, No. 1, p. 34. Plate vii., Fig. 1 (July, 1892).

Microdon bombiformis, Townsend, Trans. Am. Ent. Soc., Vol. XXII., p. 33 (March, 1895).

I have compared the types of these two descriptions in the collection of the Kansas University; there is not the least doubt but that they are the same. The type of *bombiformis* is a female and that of *megalogaster* is a male of the same species. There is only a difference in size between these two specimens. Townsend states in regard to his species, "I can hardly identify this with *megalogaster*, Snow, from the differences in the wings." The wings in both specimens are fusco-hyaline, but in the female (*bombiformis*) they are perceptibly darker along all of the veins, precisely, however, as might be expected in that sex.

The locality of the specimen described as *M. bombiformis* is Dixie Landing, Va., and that of the specimen described as *M. megalogaster*, which Snow omitted to state, is Illinois.

3. *Chrysogaster pictipennis*, Loew, Centuries, iv., 58.

Numerous specimens of this species were taken by the writer at Cedar Bluffs, in Nebraska. The species has been recorded hitherto only as far west as New York. All of these specimens seem to differ from Eastern ones only in the fact that the wings are less distinctly marked.

TABLE OF THE SPECIES OF CHILOSIA INCLUDED BELOW.

- | | |
|---|-----------------------------|
| 1. Eyes bare..... | 2 |
| Eyes pilose..... | 3 |
| 2. Anterior cross vein distinctly bent at base, and parallel to vein at base of the discal cell; thorax long pilose; opaque black species; wings very dark..... | <i>plutonia</i> , n. sp. |
| Anterior cross vein perfectly straight, not parallel to vein at base of discal cell; thorax very short pilose; shining olivaceous species; wings hyaline..... | <i>gracilis</i> , n. sp. |
| 3. Scutellum with bristles or bristle-like hairs on the margin..... | 4 |
| Scutellum without bristles on the margin; tibiae largely reddish; wings tinged with yellowish; white pilose, bluish species..... | <i>punctulata</i> , n. sp., |
| 4. Face hairy; thorax white pilose; anterior cross vein oblique; robust, shining brassy species..... | <i>pacifica</i> , n. sp. |
| Face not pilose; thorax black pilose; anterior cross vein rectangular, deep blue, shining species..... | <i>alaskensis</i> n. sp. |
| 4. <i>Chilosia alaskensis</i> , n. sp. Plate V., Fig. 4. | |

Everywhere deep blue, shining, very short pilose. Eyes pilose, arista scarcely pubescent, incrassate on the basal half, scutellum with bristle-like hairs.

Female.—Eyes very short sparse pilose, appearing white from above. Front shining blue, sparsely punctured short black pilose, with a large sulcate swollen area above the antennæ. Face very prominent, deeply concave below the antennæ to the rounded, very prominent tubercle situated a trifle below the middle of the eyes, thence shortly but not very deeply concave to the epistomal tubercle which is only slightly less prominent than the upper, and is situated considerably above the lower eye margin. Below the lower tubercle straight, slightly receding. Cheeks narrow, lower border straight, epistoma not truncated at tip. Antennæ and margin of the antennal orifice reddish-yellow, first and second joints and the narrow upper margin of the third brownish. Third joint very large, circular with the upper outer margin slightly less convex.

Arista long, basal, brown, very indistinctly pubescent. Thorax shining blackish-blue, short black pilose. Scutellum with slender bristles on the margin. Abdomen oval, wider than the thorax, everywhere shining dark blue, almost bare. On the dorsum of the abdomen the pile is black, on the margins, especially anteriorly, it is white, and on the sides of the second segment rather long. Legs black, knees and narrow base of the tibiae only lighter, short black pilose. Wings hyaline, the stigma and all the veins light luteous. L. corp. 8 mm., L. al. 8 mm.

One specimen: Cook's Inlet, Alaska; Prof. L. L. Dyche, of the University of Kansas.

5. *Chilosia plutonia*, n. sp. Plate V., Fig. 7, 9.

Allied to *C. Willistoni*. Eyes bare, arista plumose, scutellum with bristles, legs black, second and third abdominal segments opaque except the anterior corners, thorax long black pilose, wings very dark.

Male.—Frontal triangle swollen, but little shining, long black pilose. Ocellar area similarly pilose. Face not pilose, very slightly pollinose, gently concave to the tip of tubercle which is round and distinct, thence only very slightly concave to the tip of the epistoma; but little produced below the eye. Occiput long white pilose below. Antennae small, black; third joint yellowish-red, a trifle longer than broad, rectangular with the lower basal corner bulging slightly outwardly. Dorsum of thorax and pleura subshining, long, erect, black (in all lights) pilose, finely punctured. Scutellum shining, quite distinctly punctured with bristles and coarse hairs on the margins. Abdomen not wider than the thorax, opaque. There are shining brassy triangles on the anterior angles of the second and third segments; these spots extend about one-half of the width of the segment laterally and about the same distance inwardly. On the fourth segment there is a complete anterior shining band of metallic. Pile of abdomen sparse, long on the lateral margins, on the opaque portions black, on the shining portions whitish. Hypopygium shining, white pilose. Legs entirely black, long black pilose; on the anterior and middle femora the pile is long and slender, forming loose cilia, on the inner side of the posterior femora it is short and spinous. Wings very dark, especially before the anterior cross vein. L. corp. $8\frac{1}{2}$ mm., al. 8 mm.

In some lights the fourth abdominal segment seems almost entirely shining, and the anterior and middle legs seem whitish pilose.

One specimen: Cook's Inlet, Alaska; Prof. L. L. Dyche.

6. *Chilosia Aldrichi*, Hunter. Plate V., Fig. 8, a.

Several additional specimens have been received from the same locality as the type, Idaho.

7. *Chilosia gracilis*, n. sp., Plate V., Fig. 3.

Eyes bare, arista plumose, scutellum with bristles on the margin, legs black.

Female.—Shining black, somewhat greenish, almost bare. Antennæ of moderate size, first and second joints piceous, third bright reddish-yellow, somewhat longer than broad, elliptical; arista black, basal, long loose plumose. Front plane, short luteous pilose, longer black pilose near the ocelli. Face and cheeks bare, shining, lower anterior orbits very short white pilose. Face considerably obliquely produced below, with a conspicuous round tubercle below the middle moderately concave above; between the tubercle and the tip of the epistoma there is a short deep concavity. Occiput white pilose. Dorsum of thorax shining, distinctly punctured, very short black pilose in the middle and yellow pilose around the margins, quite widely so anteriorly. Pleura more olivaceous than the dorsum, shining. Scutellum with two apical and three shorter lateral bristles on each side. Abdomen everywhere shining with a greenish tinge, much broader than the thorax at the apex of the second segment, with short white pile that appears to be arranged in bands on the segments; the lateral margins of the first, second and third segments have longer erect pile. Legs entirely black, the knees, especially the anterior pair, lighter; the pile is very short, sparse, and in most lights white. Wings uniformly grayish hyaline, veins black. Tegulæ white, fringed with somewhat yellowish. L. corp. 6 mm.; al. $6\frac{1}{2}$ mm.

One female specimen: Cook's Inlet, Alaska, 1896; Prof. L. L. Dyche, of the University of Kansas.

This species is very closely allied to *C. Willistoni*. It differs, however, as follows: The tubercle is much more distinct, and between it and the tip of the epistoma there is a short deep concavity. In *Willistoni* the tubercle is so indistinct that between it and the epistoma the outline is almost perpendicular. The face is produced quite distinctly, more downwardly in this species. The pile of the dorsum is black; in *Willistoni* it is luteous. The pile of the abdomen is also much more sparse and finer; in *Willistoni* it is quite uniform and not arranged in bands.

8. *Chilosia pacifica*, n. sp. Plate V., Fig. 2, a.

Male.—Eyes pilose, scutellum with bristle-like hairs on the margin, arista bare, abdomen largely opaque, robust, thickly white pilose.

Female.—Shining brassy, abdomen broad, entirely shining, antennæ brown, third joint reddish.

Male.—Eyes long dense, whitish pilose. Front swollen, sulcate, long black pilose. Face uniformly lightly white pollinose and short, sparse, white pilose below, extending only moderately below the eyes, obliquely truncate at the apex, the lower border of the cheeks straight. In outline the face is almost straight below the antennæ to the inconspicuous, obtuse, nasiform tubercle, thence distinctly concave to the tip of the epistoma, which forms a second tubercle almost as large as the upper one. Antennæ of moderate size, the second and third joints black, third brown on the upper half, yellowish-red below, very slightly broader than long, almost square, the lower outer angle rounded. Arista, bare, basal, black. Dorsum and pleura shining greenish, densely, long, erect whitish pilose. Scutellum with long, bushy, white pile, intermixed with slightly strengthened black hairs on the margin. Abdomen but little broader than the thorax, everywhere long erect whitish pilose, first segment shining, second entirely opaque, third opaque, except a narrow posterior margin and lateral triangles reaching from the anterior margin two-thirds of the width of the segment, of shining green, fourth segment entirely shining greenish. Legs black, long white pilose. The basal third, and the narrow apex of the middle and anterior tibiæ and the basal third of the posterior are dull testaceous. The colouring of the posterior pair is very inconspicuous. Wings grayish hyaline, veins brown, stigma luteous. Tegulæ white. L. c. 10 mm., al. 8 mm.

Female.—Front shining brassy, coarsely punctured, pitted above the base of the antennæ, short white pilose. Along the eye margins, midway between the antennæ and the ocelli, there are short elevated ridges. Face shining greenish-black, short, sparse, whitish pilose below on the sides; the orbital margins densely short, white pilose. Face considerably concave below the antennæ to the conspicuous tubercle, thence with a short, deep concavity to the epistoma, which forms another less conspicuous tubercle, not produced below the eyes nor obliquely at the apex, which is broadly truncate. Lower border of the cheeks slightly concave. Occiput long yellowish pilose. Eyes much shorter pilose than on the male. Antennæ moderate in size, deep brown; third joint reddish-

brown, blackish above, slightly longer than broad, the lower corner slightly less convex than the upper. Thorax shining greenish, short white pilose. Scutellum fringed with rather short white pile, with six slender black bristles arranged as follows: two on each side near the apex, one more slender on each side near the base. Abdomen considerably broader than the thorax, everywhere shining brassy and rather short, dense, short, appressed pilose; on the lateral margins the pile is longer and erect. Legs short, whitish pilose, femora entirely black, except the extreme apex, anterior, and middle coxæ reddish, all the tibiæ obscurely reddish, except a broad subapical band occupying more than a third of the width of the tibiæ, front and middle tarsi reddish, the two apical joints blackish, posterior tarsi entirely blackish. Wings subhyaline, the basal half slightly coloured with yellowish, veins brown, stigma luteous, stumps of veins at the bases of the apical and posterior cross veins.

L. corp. 9 mm., al. 8 mm.

Two specimens: one bearing the label "Cal., R. W. Doane coll.," and the other, "Palo Alto, California, March 29, 1895."

This species is allied to *C. occidentalis*, Will., also from California. It may be distinguished, however, from that species among other characters by the colour of the pile and the presence of stumps of veins at the bases of the apical and posterior cross veins.

9. *Chilosia punctulata*, n. sp. Plate V., Fig. 6, a.

Eyes pilose, arista bare, scutellum wholly without bristles. Everywhere profoundly punctured; wings uniformly, distinctly yellowish.

Female.—Front deeply punctured, wholly without swollen processes, but little shining, pile short, dense, in some lights blackish, from above white. The orbits on the lower part of the front and the upper part of the face expanded as a narrow band just below the base of the antennæ, white pollinose. Face bare, shining black, deeply concave below the antennæ to the conspicuous round tubercle, thence shortly and deeply concave to the oral margin, which is obliquely truncate. Cheeks narrow, bare, shining, lower border straight. Antennæ situate above the centre of the eyes, second and third joints bright reddish-yellow (sometimes more brownish), first and the narrow orifice brownish. Third joint moderate, a trifle longer than broad, regularly elliptical. Arista bare, basal, yellow at apex. Eyes very short, sparse, white pilose. Mesonotum densely punctured but little shining, pile short, whitish, on pleura below the base of the wings longer and white. Scutellum without bristles,

deeply punctured like the mesonotum, with a loose fringe of fine white pile showing from below the margin. Abdomen broadly elliptical, everywhere deeply and conspicuously punctured and subshining. Pile rather abundant, white. When viewed from above and at one side the pile of the third and fourth segments seems to form broad arcuate bands curving from the apical corner of the segment inwardly. Legs white pilose; all the femora except a narrow tip black; tibiae reddish-yellow with an indication of a brown median band, more pronounced on the posterior pair. Tarsi yellow, two apical joints darkened. Posterior femora with several short spinous bristles below near the apex. Wings short, broad, uniformly tinged with yellow; veins yellow.

Length, $8\frac{1}{2}$ mm.; al., $6\frac{1}{2}$ mm.

Two specimens: West Point, Nebraska, September 9.

This species is very closely allied to *C. sororia*, Will., from Mexico and to *C. petulca* from Washington State. In the shape of the antennae and outline of the face it agrees precisely with *petulca* but differs in the absence of the scutellar bristles. This is the only character mentioned by Williston in the *Biologia C. A.* as distinguishing *sororia* from *petulca*. The character, however, in this species which leads me to consider it very distinct is the deep punctuation. The front of *C. sororia* is described as "shining metallic," and the mesonotum as "metallic green," which would certainly indicate that these parts are not deeply and closely punctured. In this species the front and mesonotum are very deeply and conspicuously punctured, so that they have a roughened, granulated appearance and are subopaque. The wings in this species are much more yellowish than the description of *C. sororia* would seem to indicate they are in that species, and there are several other differences.

10. *Melanostoma mellinum*, Linn.

Two specimens: Cook's Inlet, Alaska; coll. L. L. Dyche.

11. *Platychirus chaetopodus*, Williston. Synopsis N. A. Syrphidae, p. 59, 1896.

Four male specimens were taken on the Pine Ridge in North-western Nebraska by the writer during July, 1896. The species was described from the State of Washington and Snow has recently recorded it from Colorado. The abdominal markings are larger than the description seems to imply.

12. *Syrphus intrudens*, O. S.

Four specimens from Cook's Inlet, Alaska; coll. L. L. Dyche. The

legs are darker coloured than Osten Sacken describes them. This species has been recorded from California and Colorado.

13. *Syrphus mentalis*, Will.

Two specimens: Cook's Inlet, Alaska; coll. L. L. Dyche. This species is known from the State of Washington. These specimens show a considerable variation from the description and from each other. However, the points in which one specimen differs from the description are the very points in which the other specimen agrees. I am thus led to believe that the species is variable.

14. *Syrphus protritius*, O. S.

One specimen: Cook's Inlet, Alaska; coll. L. L. Dyche. This species was described from California.

15. *Syrphus Lesueurii*, Macq.

Two specimens: Cook's Inlet, Alaska; coll. L. L. Dyche. This species has been recorded from New England and once from the Pacific Coast.

16. *Syrphus umbellatarum*, O. S.

Two specimens: Cook's Inlet, Alaska; coll. L. L. Dyche. This species has been recorded from New Hampshire to Arizona, but never from the North-west. This record gives the species an immensely increased range.

17. *Baccha clavata*, Fabr.

One female specimen taken on flowers of *Aster multiflorus*, Sept. 28th, 1896. It differs from the description in having two small yellow spots on the first abdominal segment corresponding to those on segments two and three and in lacking the white pile on all except the first. It is without doubt, however, this species. This is the second occurrence of this species at Lincoln, Nebraska. It was previously taken in 1895 under similar circumstances.

XANTHOGRAMMA, Schiner.

The astute Prof. J. Mik (Wien. Ent. Zeit., 1897, p. 65,) has discovered a character that will separate this genus from *Syrphus* as far as the European species of these genera are concerned. He states: "Als ein bezeichnendes Merkmal für die Gattung *Xanthogramma* habe ich Form und Farbe der Umwallung (das sind die Klappen) des Metathoracicalstigma (ueber den Hinterhüften) gefunden. Diese Umwallung ist bei allen Arten nicht sehr hoch; sie ist schwarz und trägt auf dem freien Rande kurze, feine, schwarze oder braune Wimperhärchen."

I have sought in vain to apply this character to the North American species of these genera. I have had, unfortunately, the opportunity of examining but one species of *Xanthogramma*, *X. flavipes*, Loew, and it is quite possible that the other species of the genus may differ from it in precisely this respect. However, it is important that the character that will separate all of the European species of these genera finds its exception in this one North American species at least.

In the absence of a positive illustration of the character used by Prof. Mik, I have had some difficulty in conceiving exactly what he means. I take it, however, that the "Umwallung" is the elevated orifice of the metathoracical spiracle and the "Klappen" are the lids fitting over them and bearing on their free edges cilia of the fine black or brown bristles. If I am right in this, the character does not apply at all to *X. flavipes*. The orifice of the spiracle is not in the least elevated more than in any of the fifteen species of *Syrphus* which I have examined with special reference to this character, and the cilia is not black or brown, but only slightly yellowish.

18. *Baccha lemur*, O. S.

Four specimens: Colorado Springs, Colo., Aug. 1896; Prof. Bruner.

These specimens show no variation among themselves, nor differences from the description. The posterior femora uniformly have only an indication of a preapical ring.

19. *Volucella apicifera*, Townsend, Trans. Am. Ent. Soc., 1895, p. 40.

One male specimen, Las Cruces, New Mexico; coll. Townsend, April 8, now in the collection of Prof. Aldrich I have examined. The type of this species, which I have also examined in the collection of the Kansas University, which was taken at Las Cruces, N. M., April 17, and this specimen agree throughout. This species is certainly, as Mr. Townsend states, very closely allied to *V. isabellina*, Will. It differs in some respects in precisely such points as a tenental form of that species would be supposed to differ. However, the markings of the legs and abdomen are exactly the reverse of what would be expected if this were an external form of *V. isabellina*; i. e., they are darker and more extensive. I am inclined to think, with Mr. Townsend, that there are here two distinct though closely related species.

Pyritus, nov. gen. [*pyritus*, a precious stone].

Large black, thickly pilose species, without lighter markings. Marginal cell open, anterior cross vein in middle of discal cell, third vein

straight. Antennæ short, third joint very broad; arista basal pilose. Eyes long pilose, widely contiguous in the male. Femora and coxæ simple, without spines or tubercles. Face very broad, the diverging eye margins form an angle of at least 80 degrees; the apex is just above the antennæ, swollen. (In *Sericomyia* and *Arctophila* the eye margins are almost parallel.)

Type of genus, *Pyritis montigena*, n. sp., North America.

This genus falls naturally into Williston's tribe Sericomyini, which contains the genera *Sericomyia* and *Arctophila*. From both of these it may be easily separated by the peculiar formation of the face and the pilose eyes. There is one genus in the Volucellini, *Phalacromyia*, which has the marginal cell open. From this it differs in having the outline of the face rounded and not produced conically downward, and also in having the third antennal joint circular and not elongate. The distinctive character of this genus, however, is the remarkably wide and swollen face.

20. *Pyritis montigena*, n. sp. Plate V., Fig. 1, a, b.

Male.—Black opaque, thickly pilose. Eyes long, dense black pilose. Face and front shining, sparsely clothed with yellowish pile, intermixed with black. Front very distinctly sulcate. Face swollen, perpendicular to below the eye margins, thence receding and very slightly concave to the oral margin. Antennæ black, third joint reddish, broader than long; arista long, loose pilose on the upper side, much less so below. Thorax long, dense, whitish-yellow pilose, the margins and three narrow indistinct central lines shining. Scutellum shining, dull testaceous. Abdomen covered with long, erect, dark yellow pile; first and second segments opaque; third with a shining band on the anterior margin, becoming more opaque towards the middle, where it is broadly interrupted; fourth segment entirely shining, except a subopaque band widely interrupted in the middle. Legs entirely black; long yellowish pilose intermixed with black on the anterior pair. Posterior pair somewhat arcuate. Wings subhyaline, with black clouds on the cross veins, and at the furcation of the second and third veins. Third vein perfectly straight. L., 12 mm.

One specimen: Moscow, Idaho; coll. Prof. J. M. Aldrich.

21. *Eristalis Meigenii*, Wiedemann, Ausseurop-Zweiflg.—Ins., ii., 177, 35, tab. x. b., f., 15 (1830); Williston, Proc. Am. Phil. Soc., xx., 322 (1882); ibid Syn. N. A. Syrphidæ, p. 165 (1886); ibid Trans. Am. Ent. Soc., xiii., 318 (1886); F. Lynch-Arribalzaga, Anales, d. l., Soc. Cien. Argentina, xxxiv., p. 38 (1892).

Eristalis foveifrons, Thomson. — *Eugenies Resa*, Dipt. 419, 78 (1878); Williston, Trans. Am. Ent. Soc., xiii., 318 (1886).

Eristalis Androclus, Osten Sacken. — Western Dipt. 337 (1877); non-Walker, List, 612 (1849); *ibid* Cat. N. A. Dipt., note 223, p. 249 (1878); Williston, Synopsis N. A. Syrphidæ, 165 (1886).

Eristalis Brousi, Williston. — Proc. Am. Phil. Soc., xx., 319 (1882); (Brousi), *ibid* Synopsis N. A. Syrphidæ, 165 (1886); Snow, Kans. Uni. Quart. Vol. i., p. 38 (1892); *ibid* *idem*, Vol. iii., p. 243 (1895); Townsend, Trans. Am. Ent. Soc., xxii., 48 (1895); Hunter, CAN. ENT., XXVIII., p. 98 (1896).

This species was described by Wiedmann in 1830 from specimens from Montevideo in South America. Thirty-eight years later Thomson, in his work on the Diptera of the *Eugenies Resa*, redescribed it under the name of *Eristalis foveifrons*, basing his description on specimens from Buenos Ayres.

For some time previous to 1877 Osten Sacken and Loew had been sending out specimens of a species which they identified, however not certainly, as the *E. Androclus* of Walker's List, iii., 612, to their correspondents under that name. Osten Sacken has a note in his Western Diptera (1877) concerning this species which he still at that time considered as Walker's species, *E. Androclus*. Between this time and the time of the publication of Osten Sacken's catalogue in 1878, he had examined the type of Walker's species in the collection of the British Museum and found that it was a *Helophilus*. However, he retained the name *E. Androclus*, O. S., (non-Walker) to avoid confusion.

Now, strangely enough, Dr. Williston, in Proc. Am. Phil. Soc., xx., 319 (1882), recognized the male of this species as *E. Meigenii*, but at the same time described the female as *E. Brousi* (sic). In the synopsis this was corrected and the name *Brousi* given to replace *Androclus*. It was only the immense difference in localities that prevented Dr. Williston's identification of this species with *E. Meigenii*, as he states that the full description applies almost perfectly. He is now of the opinion that they are the same, and it is at his suggestion that the investigation which has resulted in the above arrangement of the names was undertaken.

22. *Eristalis occidentalis*, Will.

Five males and three females from Cook's Inlet, Alaska; coll. Prof. Dyche. Some of the males agree quite well with the description, except that the basal joints of the middle tarsi are not yellowish, which was an

error in the description, and there is no yellow posterior margin on the second and third abdominal segments. The pile of the median segments may be yellow, or mixed with black, or chiefly black. In the female the third and fourth segments are covered with dense deep black pile, and there is no posterior opaque margin on the third or else a very narrow one. This species has elsewhere been recorded only from the State of Washington. [Williston.]

23. *Eristalis montanus*, Will.

Several specimens of this species were taken during July on the Pine Ridge in North-western Nebraska. They all have the black on the second abdominal segment as broad on the posterior margin as on the anterior; some of them have an indication of an opaque cross band on the posterior part of the third, and in others the posterior part is entirely shining. The pile of the eyes is entire.

These specimens were captured hovering over a small, shallow pond, at an elevation of a trifle over 4,000 feet.

24. *Helophilus latitarsis*, n. sp.

Male.—Antennæ black; arista yellowish at the base. A spot directly above the antennæ, a broad facial stripe ending abruptly before the base of the antennæ: cheeks and narrow oral margin shining black, the facial stripe may be more brownish. Front, except the vertex which is opaque black and black pilose, and face densely yellowish pollinose and yellow pilose. Face in profile not at all conically produced below, gently concave below the antennæ to half way to the epistoma, thence perpendicular to the notched epistoma. Lower border of cheeks forms with the plane of the occiput only a very little more than a right angle. Dorsum of the thorax opaque black, everywhere short yellow pilose, complete lateral margins yellow, two median moderately broad uninterrupted silvery white stripes which reach the scutellum. Scutellum entirely testaceous pile black, on the very narrow posterior and anterior margins yellow. Abdomen, first segment opaque black, the extreme angles yellow. Second segment opaque with a very narrow posterior margin shining, bright yellow with a broad central stripe of deep opaque black not reaching posterior border and expanded on the anterior border so as to cover three-fourths of the width of the segment; posterior band ferruginous, very narrow at the lateral angles and increasing in width to the centre of the segment, where it unites with the central stripe; pile short, yellow except on the posterior margin. Third segment yellow, tinged with red-

dish posteriorly, where there is a complete narrow reddish cross-band, pilose as in the preceding segment, the black markings consist of a triangular spot, the base of which extends two-thirds of the width of the segment behind, the sides of which are concave and the apex of which is expanded unto a small elliptical spot extending less than one-third of the width of the segment, touching the anterior margin. Fourth segment with the lateral margins narrowly and the posterior margins more widely yellow, for the rest black with a broad subinterrupted pollinose band, leaving a narrow anterior band and a posterior triangle shining black, pile of posterior third black. Femora black, apical third of anterior and middle pairs yellow, an obscure reddish spot near the apex of the posterior pair; anterior tibiae yellow on basal half, intermediate entirely and posterior with only an apical band. All the tarsi except the intermediate metatarsi black; the anterior tarsi, especially the metatarsi, are very evidently widened and swollen. The posterior femora slightly thickened, their tibiae slightly arcuate, unarmed. Wings cinereous hyaline. Length, 11 mm.

One specimen: Minnesota.

This species belongs to the *groenlandicus* group. It is easily separable from *glacialis* and *borealis* by the only gently concave face. From *groenlandicus* it differs: (1) The median dorsal stripes are not very narrow, but broad, distinct, and reach the scutellum, the lateral thoracic stripes are not obsolete posteriorly; (2) the femora are more extensively yellow at the apex; (3) the pile of the thorax is everywhere yellow. From *H. Dychei*, Will., it differs in the less robust and less pilose body throughout, in the outline of the face, which in that species is obtusely conically produced and which is perpendicular below the middle in this species, in the fact that the facial stripe ends abruptly before the base of the antennae; the median dorsal stripes are wider and reach the scutellum, the scutellum is largely black pilose (in *Dychei* the pile of the scutellum is entirely yellow), the apical femoral bands are wider, and there is a much greater extent of yellow on the third and fourth abdominal segments.

Mr. W. A. Snow has a note concerning a specimen of a species of *Helophilus* of the *groenlandicus* group (Kansas Univ. Quart. iii., 243) which in some respects differs from *groenlandicus* precisely as this species does. From the short note given by Mr. Snow I am not certain that his specimen belongs to a species distinct from mine. In his specimen the pile of the dorsum is entirely yellow, the median stripes reach the

scutellum, and the middle femora are yellow at the apex. In all of these characters it agrees with mine. On the other hand, his specimen has the dorsal stripes narrow, and the lower border of the cheeks forms with the plane of the occiput an obtuse angle. In these characters it differs from mine. A comparison of specimens is necessary to clear up the difficulty.

I have noticed in the anterior metatarsus of this species a formation that I think is of considerable value as a specific character, and which apparently has not been observed in any other species of the genus. In this species it is widened and swollen considerably more than in any of the species of *Helophilus* with which I am acquainted. My autoptic knowledge of the species of this genus includes almost all of the species except those of the *groenlandicus* group, and of that group I know only *H. Dychei*, Will. Since that species has the tarsi somewhat wider than the other species of the genus, and since the authors have paid no attention to the tarsi, I am not certain but that in the *groenlandicus* group this character is not of much value. I am certain of this, however, that the swollen anterior metatarsi of the male of this species will separate it from any member of the genus outside of the *groenlandicus* group.

25. *Helophilus Dychei*, Williston, Ms.

Male.—Face below the antennæ only lightly concave; on the lower half nearly vertical and straight in profile; the lower line of the head forms with the plane of the occiput an obtuse angle; face on the sides yellowish-white, the median stripe black; cheeks black. Antennæ black. Front on the lower part yellowish-white with yellowish pile; on the upper constricted part more brownish and with longer blackish pile. Mesonotum opaque black, with two slender, yellowish or yellowish-white stripes, sometimes narrowly interrupted at the suture and reaching only about half way from the suture to the scutellum, pile abundant, dusky yellow. Scutellum light yellow with yellow pile. Abdomen black, the second segment with two large yellow triangular spots, extending the whole width of the segment; third segment with the anterior angles yellow, the black of the second segment is opaque or subopaque with the narrow hind margin metallic; that of the third segment is opaque on the anterior half or a little more; third segment wholly shining, no whitish lunulate spots; pile erect, yellowish. Legs black, the immediate tips of the femora and the base of the tibiæ yellow. Hind femora moderately dilated; hind tibiæ arcuate. Wings cinereous hyaline; sixth vein sinuous. Length, 1-2 1/2 mm.

The female scarcely differs. There is an indication of a gray lateral stripe on the mesonotum at the humeri. The species is closely related to *H. gröenlandicus*, Stæger, but differs in the extent of the shining colour of the abdomen, the absence of the pollinose spots on the abdomen, and the colour of the pile of the mesonotum and abdomen in part. There are no yellow markings whatever on the fourth abdominal segment.

Four specimens : Sitka, Alaska ; Prof. L. L. Dyche.

The above description is Williston's. The manuscript containing it was most generously turned over to me by Dr. Williston, with the permission to change it in any manner I might see fit. I have not found any change or addition to be necessary.

26. *Helophilus mexicanus*, Mcq.

I have a specimen of this species from Custer in the centre of the black hills in South Dakota. The description applies exactly. This species has not previously been recorded except in Mexico and on the Pacific Coast.

27. *Helophilus pilosus*, n. sp.

Female. — Pile everywhere, including the face, long and rather abundant. Antennæ reddish-yellow. Front opaque black, clothed with yellow pollen on the lower half or more, everywhere black pilose. Face entirely yellow, rather deeply concave below the antennæ, thence almost perpendicular, produced downwards so as to form a short, regular, sharply-pointed cone. Cheeks black, their lower border forming with the plane of the occiput a very obtuse angle. Dorsum of the thorax opaque black, with four broad, complete yellowish-white stripes, the central black interval without whitish line ; pile short yellow. Scutellum yellow, with a blackish cast ; apical margin more yellowish, pile yellow. Abdomen a trifle broader than the thorax, the sides almost parallel, pile everywhere yellow, short except on the margins of the second segment. First segment whitish pollinose, a rather large spot on each side yellow. Second segment opaque, the posterior margin shining black, on each side with an L-shaped spot of yellow extending three-fourths of the width of the segment, their inner side concave ; these spots leave a very broad interval of black between them. Third segment with a broader posterior margin of shining, with two small arcuate spots beginning at the anterior angles, not approaching each other, of yellowish pollinose. Fourth segment shining on the apical half, with two similar but almost straight spots separated at their inner ends by only as much as their width. Fifth

segment entirely shining. Legs yellow ; anterior and middle femora with a wide black stripe, attenuated on the apical part on upper side, reaching into the apical third of the femora. Posterior femora with a very broad median band and a very small apical spot black. All the tibiae yellow, the posterior pair more brownish, especially at the base and apex. Tarsi yellowish, the posterior pair somewhat brownish. Wings hyaline. Length, 9 mm.

One specimen : British Columbia.

This species differs from *H. hamatus*, Loew, in the broad abdomen, although it agrees rather closely with the description of that species in coloration. From *H. divisus*, Loew, it differs in having the face not broadly truncate on the lower portion, but sharply conical ; in the absence of black markings on the apical portion of the anterior tibiae, the absence of a light stripe in the median dorsal black one, and very greatly in the maculation of the abdomen. From *H. integer*, Loew, it differs in not having complete abdominal bands, in the darker femora and the absence of the facial stripe ; and from *H. obsoletus*, Loew, in the distinct markings of the thorax and the darker legs.

28. *Helophilus latifrons*, Loew.

Several specimens : Cook's Inlet., Alaska ; coll. L. L. Dyche.

29. *Helophilus divisus*, Loew ; Centur. N. A. Dipt., iv., 78.

I have a male and a female specimen of this species which were taken in coitu. They bear no locality label. Another male bears the label "Westville, N. J." The males differ in the following respects from the females in the maculation of the abdomen. Second segment yellow except an opaque black anterior band not reaching the lateral margins by its own width, about one fifth of the length of the segment, a similar posterior band narrowed at the ends but reaching the lateral margins, and a broad median longitudinal band connecting the two, the posterior margin yellow with a small pollinose spot in the middle. Second segment yellow with the black markings similar but less extensive, the anterior band only a third of the width of the segment, the posterior one with the sides slightly arcuate, the interior corners of the yellow spots and a large median posterior spot between the arcuate bands pollinose. Fourth segment entirely yellow pollinose except a slender inverted Y-shaped mark, the base of which touches the anterior margin of the segment, and the broadly divaricate segment entirely pollinose.

There is in the male near the base of the posterior femora below an obtuse tubercle covered with very short black bristle-like hairs. In this character this species shows a relationship with *H. chrysostomus*, Wied., of this country, and a stronger relationship with *H. frutetorum*, Fabr., and *H. versicolor*, Fabr., of Europe.

30. *Helophilus integer*, Loew: Centur. iv., 78.

I have a female specimen of this species taken at Newark, New Jersey. I would make the following additions to Loew's rather short description:

Face and cheeks yellow, front black pilose, below yellow and above black pollinose. The middle, as well as the anterior and posterior femora, have small black spots on the inside at the base. These spots consist of a dense mass of minute spinous bristles. The black colour at the base of the scutellum is visible only when viewed from in front, as is the case in the related species of the genus.

31. *Helophilus aureopilis*, Townsend, Trans. Am. Ent. Soc., xxii., p. 51 (1895), is the same as *H. letus*, Loew, Centur., iv., 77 (1863).

I am unable to see any differences between the description given by Mr. Townsend and Williston's description (Synopsis N. A. Syrphidæ, 189) of *H. letus*, Loew. I have also examined the type of *H. aureopilis* in the collection of the Kansas State University, and compared it with specimens of *H. letus* from New York and Colorado and find not the slightest differences between them. Mr. Townsend describes his species as "*H.*, n. sp., aff. *flavifacies*, Bigot." *Helophilus flavifacies*, Bigot, Ann. Soc. Ent. Fr., 1883, 344, must certainly be a distinct species that will be very likely recognized in time. It differs especially in the coloration of the posterior legs, which are described by Bigot thus: "Avec trois anneaux bruns, l'un, sis à l'extrémité des cuisses les deux autres sur les tibias," thus lacking the broad conspicuous black median band on the femora. Besides this the bases of the anterior and middle femora are presumably at least yellow in Bigot's species since he does not mention that they are black, and there seems to be a difference in the maculation of the abdomen.

32. *Pterallastes perfidiosus*, n. sp. Plate V., Fig. 5, a, b.

Front and cheeks black, the former with long erect black pile, intermixed below with yellow. Face yellow, pilose, slightly concave to tip of the inconspicuous tubercle, thence straight and slightly receding to the epistoma, which is truncate at the apex. Antennæ and arista yellow, third

joint a trifle broader than long. Thorax opaque black, with narrow yellow lateral borders, rather short, sparse, yellowish pilose. Scutellum translucent yellow, with an apparent black in some lights. Abdomen shaped like that of *P. thoracicus*, but a little more elongate, short yellow pilose, first segment black, somewhat shining; second opaque black, except a complete posterior cross band, and with elongate lateral yellow triangles, which reach from the anterior angle to just before the posterior shining band, and the inner angle of which extends towards the middle of the segment about a fourth of its width; third segment shining, except a large, square, opaque spot with deep indentations on the sides, situated on the anterior part of the segment; fourth segment with a similar much smaller spot. All the femora black on the basal half, the anterior pair more extensively so; tibiæ yellow, the posterior pair more or less tinged with brown at the base and apex, posterior tarsi black. Posterior femora considerably thickened with short spinose bristles below, the femora arcuate. Wings hyaline, third vein very deeply bent, marginal cell wide open, last section of the fourth vein straighter than in *P. thoracicus*, anterior cross vein in the middle of the discal cell. L., 10 mm.

Described from two female specimens bearing the label "British Columbia."

The very great differences between this species and the only other described species of the genus *P. thoracicus* has caused me no little trouble in ascertaining its generic position. The extreme looseness of the definition of the genera of the Syrphidæ makes it impossible in many cases to locate a given species in its proper genus, except by a process of finding where better than elsewhere it may be placed. The present is by a great deal the best illustration of this fact that I have so far discovered. Its location in the Eristalini is without any doubt whatever. But as between *Triodonta*, *Teuchocnemis*, *Mallota* and *Pterallastes*, it seems to fit into one about as well as into another. Of these we may more easily throw out of consideration *Mallota*, on account of the formation of the face and general great pilosity, although the venation is precisely as in that genus. We may next dispose of *Teuchocnemis*, in which the third vein is only moderately bent, although we are here approaching differences that are only of specific value. As between *Pterallastes* and *Triodonta*, as far as the female sex is concerned, I know of no distinction sufficient to be called generic. In the male sex there are, however, good and sufficient grounds for generic separation. What has led me to place this species in

Pterallastes rather than in *Triodonta* is simply the general habitus. I think that too much importance has been placed on the presence of pollen on the thorax as a generic character.

33. *Criorhina verbosa*, (Harris) Walker. List iii., 568.

I have one male specimen bearing the label "St. Anthony Park, Minn." that I am quite certain must be this species. The description applies exactly except as to the median facial stripe. A thick coating of grayish pollen covers the face uniformly throughout; the cheeks, however, are shining.

34. *Pocota bomboides*, n. sp.

Black, but little shining, face black, first three abdominal segments black pilose.

Male.—Very much like *P. grandis*, but legs unarmed and much smaller. Antennæ and arista reddish-yellow, the basal joints brownish. Face black, indistinctly white pollinose, a broad stripe and the cheeks shining. Dorsum of the thorax long yellow pilose before the base of the wings, the remainder and the scutellum black pilose. Abdomen—First three segments black pilose; all except the first with indistinct posterior margins. Fourth segment more shining than the others, with a band of dense long yellow pile occupying the anterior half, the remainder of the segment black pilose. Legs simple, without spines or tubercles, black pilose; all the femora black except the extreme apex, on the posterior femora the apex is more broadly reddish; anterior tibiæ on the basal half, middle except an indistinct broad band, posterior entirely dark reddish brown, tarsi all reddish, two apical joints black. Wing strongly tinged with reddish, forming a large spot extending from the stigma to the base of the second posterior cell. L. corp., 12½ mm.; al., 11½ mm.

One specimen: Summit Sierra Nevada, California.

This species must resemble *P. apiformis* of Europe even more than *P. grandis*, Will., does. It differs from that species in not having yellow pile on the third abdominal segment and in the face being entirely black. It is very striking in general appearance as a miniature of *P. grandis*, Will. It is, however, easily separable from that species by the unarmed femora, coloured wings and black face.

The above is a manuscript name by Dr. Williston which I found attached to the specimen in the collection of the Kansas State University. The manuscript containing it had been misplaced. I thus continue the name although the description is my own.

35. *Brachypalpus inarmatus*, n. sp.

Very similar to *Brachypalpus frontosus*, Loew, but differs in the fact that the coxæ, femora and tibiæ of the male are entirely unarmed.

Male.—Antennæ dark reddish-brown, third joint slightly darker on the lower basal corner; first joint shining; arista yellow, its apex fuscous. Face front and cheeks bluish-black, somewhat shining, covered, except a broad oblique stripe on cheeks, with silvery pollen, more dense on the front, which in some lights obscures the ground colour. Occiput below with long yellowish pile. Face in profile concave, but the concavity not receding nearly as low as the lower border of the eyes nor as far back as the eye margin. Dorsum of thorax light shining green with four cupreous stripes, the median ones more slender and all abbreviated behind the middle; the pile yellow and rather abundant. The scutellum and an irregular, poorly defined area in front of it on the dorsum cupreous. Abdomen shining purplish-black, with yellow pile longer on the sides of the second segment and on the posterior margin of the fourth, where it forms a conspicuous fringe. In the middle of the second segment there is a small, slender, opaque spot not reaching the posterior margin. Legs black; femora long golden pilose, the extreme apex of the femora, the narrow base of the tibiæ, and the tarsi, except the last two joints, black. Posterior femora and coxæ without spurs or protuberances, the former moderately incrassate. Wings distinctly infuscated on the anterior half.

One male specimen: Vollmer, Idaho, May 30th, 1896; Prof. J. M. Aldrich.

There are differences between this species and *frontosus* in the face, which is uniformly pollinose, but bare and shining below the antennæ in that species, in the presence of a golden fringe on the posterior margin of the fourth abdominal segment, in the pile everywhere being golden and not gray as in that species, the posterior femora are less curved and the tibiæ are darker than in my specimens of *frontosus*.

It has occurred to me that this might be simply a dimorphic form of *B. frontosus*, holding the same relation to that species as the form *Bautias* holds to *Mallota cimbiciformis*, Fall. From the differences enumerated above, however, it does not appear that such can be the case.

36. *Xylota barbata*, Loew.

A single male specimen [Santa Cruz Mountains, California, 18th April] agrees so well with the description of this species that I am constrained to think it is this species, although it lacks the posterior coxal

spurs. It has occurred to me that possibly where Dr. Williston, in the Synopsis, p. 234, says "hind coxæ unarmed," he meant to state exactly the reverse. The second and third abdominal segments are opaque, but have obscure yellowish, shining spots; the fourth segment is entirely shining bluish-black. The thoracic dorsum and scutellum are brilliant purplish-metallic.

37. *Xylota analis*, Will. Synopsis N. A. Syrphidæ, 226.

I possess a male specimen of this species taken on the Pine Ridge in Nebraska in July. This specimen agrees exactly with a specimen from San Pedro, California, Aug. 1896. This species has not been recorded outside of New Mexico and California.

38. *Xylota fraudulosa*, Loew. Centur. v., 41.

I have specimens of this species taken in North-western Nebraska.

39. *Xylota ejuncida*, Say.

One specimen: Cook's Inlet, Alaska; coll. L. L. Dyche.

40. *Mallota facialis*, Hunter.

This species was described from a single male specimen from Pine Ridge, Nebraska. This season's collecting includes another specimen from the same region that is in every way a verification of the views I held at that time.

41. *Triodonta*, sp.

I have a female specimen of a species of this genus from Palo Alto, California, which undoubtedly is a species distinct from *curvipes*, Wied. It is, however, so closely allied to that species that I hesitate to describe it from only the female. Doubtless in the male there are abundantly sufficient characters for specific separation. This specimen differs from the female of *T. curvipes*, Wied., in having the thorax almost bare and shining, not densely brownish pollinose. The abdomen is bare and shining black with the narrow posterior margins of the segments yellow, with only very slight indications of pollinose spots on the segments laterally. It is also much smaller, 8 mm. in length.

42. *Tropidia montana*, Hunter; Ent. News, 1896, p. 215. (Change of name from *T. nigricornis*, which is preoccupied. See Ent. News, 1896, 305.)

Since writing the description of this species I have examined a female specimen of *Tropidia incana*, Townsend (Trans. Am. Ent. Soc., 1895, p. 53), from Colorado, as well as the type of that species in the

collection of the Kansas State University. From this examination I am enabled to give further differences between these two species which are very closely allied.

The face in *incana* in the female is distinctly more concave than in *montana*. In *incana* the face recedes from the apex of the antennal callosity to half way to the epistoma; from that point the outline of the face projects outwardly at the same angle that the upper half recedes inwardly. In *montana* the outline of the face on the upper half is exactly the same as in *incana*, but on the lower half the outline is an almost perpendicular line. Besides this the front is somewhat narrower in *incana*, the spots of the abdomen are much larger and the pile is considerably shorter.

43. *Tropidia mamillata*, Loew, Centur. i, 68, 1861.

Four male specimens of this species were taken by the writer at Cedar Bluffs, Nebraska, in April, on flowers of *Prunus virginicus*. This is, I believe, the only record of the capture of this species since the publication of Loew's first Century in 1861. The locality given in that case was Illinois.

LIBELLULA DEPLANATA OF RAMBUR.

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.

In December, 1896, Mr. Adolph Hempel sent me from Orange Co., Fla., some full-grown dragonfly nymphs which were apparently not to be referred to any of our known genera. At my request he undertook to breed some of them, and soon had imagoes of the species named above. In the letter which accompanied his bred specimens he recorded some careful observations, which are so interesting and valuable I deem them worthy of permanent record. The following account of the habits of this species is from Mr. Hempel's letter:

This species frequents small ponds and the borders of adjacent woods. Imagoes fly, when undisturbed, quite leisurely. They will hover over one spot, then dart a few feet aside and hover again and again. The males are often found in low places about ponds, resting on the ground with wings aslant downward and forward. Sometimes they rest on reeds or snags in the water; sometimes out in the pine woods several hundred yards from water; they may be found resting on the sand warmed by the sun, on logs or on trees.

The female deposits her eggs while hovering over the water, descending to dip the tip of her abdomen repeatedly. She is generally interrupted in her peaceful occupation and soon driven away by the too importunate males. The females remain for the most part in the woods and come from the woods to the ponds to oviposit, but hardly has one shown herself over open water before several males are in pursuit and she quickly disappears again. The difference in the haunts of the sexes is so marked that males would seem largely in excess to one who collected only beside the water, females so to one who collected only in the woods.

The nymphs are quite active. When in the water they rest with the long abdominal appendages widely spread apart; but withdrawn from the water, these are brought together so that the abdomen seems to end in a long point. When picked up they have a habit of curving the abdomen as if to strike with the terminal spines. Their transformation takes place in the early part of the forenoon, and imagoes leave their empty old skins generally clinging to stumps and logs fallen in the water.

The full-grown nymph measures 23 mm.; abdomen, 16; hind femur, 5.5; width of abdomen, 6; of head, 4.5. Body slender, not depressed; abdomen smooth; thorax and legs clothed with tawny hairs.

Colour fulvous, yellowish beneath and on sutures; eyes black; sides of thorax indistinctly marked with black; apical third of abdomen reddish, with two broad black lateral stripes.

Head wider than long; eyes not remarkably prominent; vertex roundly elevated. Rear of head straight or very slightly concave.

Labium moderate; mentum without raptorial setæ; median lobe prominent; its border crenulate, with single spinules between the crenulations. Lateral lobes ample; movable hook nearly straight to the short, abruptly incurved tip; raptorial setæ 6 each side; teeth of opposed margins crenate, each ending in a sharp, incurved hook, and armed with a stout spinule.

Meso-thoracic stigmata separated by less than the width of one of them. Wing-cases reaching well upon the 6th abdominal segment.

Abdomen lance-oval, with sharp lateral margins. Long, straight, sharp, lateral spines on 8 and 9. Dorsal hooks on 4 to 8, the first erect spine like the others directed backwards, the hindermost with their dorsal margin forming a straight line to the base of the segment; 9th abdominal segment hardly longer on ventral than on dorsal side; 10th segment a little shorter than 9th, conical. Abdominal appendages very long (13 mm.) and sharp, longer than segments 9 + 10; superior and inferior appendages equal; laterals one fourth as long.

Libellula deplanata, Rambur, is but a smaller southern variety of *Libellula exusta*, Say, as was pointed out by Mr. P. P. Calvert in 1893 (Trans. Amer. Ent. Soc., XX., 258). But in recent repeated dismemberment of the genus *Libellula* no part of it has been left to bear that name

in America. As genera go the European *Libellula depressa* of Linnæus is certainly worthy to stand alone, and by all the recognized codes it has the right to the original generic name. So that our N. American species belong to *Leptetrum*, Newman; *Plathemis*, Hagen; *Belonia*, Kirby, or *Holotania*, Kirby; and Kirby (1890 a Synonymic Catalogue of Neur. Odon., London) has distributed our species rather freely among all these genera. I now have nymphs of species referred by him to all the genera, and, unfortunately, they do not confirm his arrangement of the imagoes. The unknown nymphs still in the majority would doubtless lend the best aid to drawing the lines where they belong.

As implied at the outset, the nymphs described above differ by good generic characters from all others known to me. They differ from all Libellulid nymphs which I have seen by the entire absence of raptorial setæ from the mentum of the labium. They are distinct from the nymphs representing the four genera named above by several additional characters: by hooked teeth on opposing edges of the lateral labial lobes; by the extreme elongation of the abdominal appendages and especially by the shape and relations of the 9th abdominal segment which is not longer on the ventral than on the dorsal side, and consequently does not at all appear to enclose the 10th segment. The following characters of venation taken together appear to clearly segregate the imago: (1) The sectors of the arculus are not stalked in either wing. (2) The sub-triangular space consists of three areoles. (3) A short sector, which may be called the *apical sector*, arising beneath the stigma from the principal sector and extending to the apex in both wings, in this species arises under the proximal fourth of the stigma. This *apical sector* develops from a tracheal branch, is very constant in position, and may readily be recognized even when somewhat irregular if taken in connection with another which may be called the *sub-apical sector* which (in Libellulidæ) lies just posterior to it, parallel with it, and separated from it, except at the proximal end, by a single row of areolets. Hagen, describing *Libellula deplanata*, Rambur, in 1861 (Syn. Neur. N. Amer., p. 154), questioned whether it belonged to the genus. The nymph supplies an emphatic negative, which the venation and doubtless other adult characters corroborate, and which is equally applicable to the more recent subdivision of the genus. I therefore propose a new genus *Ladona* with *L. exusta*, Say (= *L. deplanata*, Ramb.), for its type. And for this interesting and locally common species, which ranges from Florida and Maine to the Columbian River basin, because of its very distinctive white humeral stripes, I would suggest the common name, "the Corporal."

NAKED AND COCOON PUPÆ OF ANTS.

BY GEO. B. KING, LAWRENCE, MASS.

Ordinarily the tribe Camponotidæ can be separated from the other tribes of ants by its habit of having cocoon pupæ in which their young go through their transformation period; whereas those of the (so-called) aculeate genera remain naked and do not spin a cocoon, it will appear, however, if diligent search be made, that several species of this tribe (Camponotidæ) do have naked pupæ, mixed with their cocooned ones. Latreille seems to have been the first to discover that *Formica fusca*, L., had naked and cocoon pupæ. He could not, however, understand why this should be, and indeed it remains one of the dark mysteries of the present day. So far as I am aware no other species of ants have been listed, other than *Formica fusca*, L., having this habit. During my researches in the study of the ants of Massachusetts, I have found that other species have acquired the same habit. And to satisfy myself that no mistake was made on my part in the determination of the larva, cocoon or imago, I sent samples of them to my friend and co-worker, Mr. Ernest Andra, of France, for his opinion, and at the same time enquired of him if any of the ants of Europe had been discovered with naked and cocooned pupæ, other than *F. fusca*. In his reply he stated that *F. fusca* is very frequently found with these two forms, and occasionally *Formica sanguinea*, Latr.; *Lasius niger*, L.; *Lasius fuliginosus*, Latr., and *Polyergus rufescens*, Latr., have been found in Europe having naked and cocooned pupæ, the last four species being very rarely met with in this condition. The species having this habit thus far found by me in Massachusetts are:

Formica fusca, L., var. *subsericea*, Say.; June 8.

" " " sub. sp. *subpolita*, Mayr.; June 20.

" *lasioides*, Em., var. *picea*, Em.; July 31.

This list may be extended after further research; they are, however, not very frequently met with. The season of the year in which they are to be found being hot and dry, and the ants much more active at this time, as their usual custom is, they will hasten off with their young very rapidly to the underground retreats of their nests, making it quite difficult to obtain samples of either. Furthermore, I might possibly have found more with similar habits if this were the only work which I am investigating, but as I am studying all the insects living with ants, it is quite possible that in many instances their cocoons and pupæ are overlooked.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXIV. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(Continued.)

MOLORCHUS, Fabr.

Easily recognized by the very short elytra which are divaricate and separately rounded at apex, about equalling the prothorax in length. *M. bimaculatus*, Say (fig. 23), is somewhat variable in colour, but is ordinarily black except a large testaceous blotch on each elytron. The thorax is rather broad, roughly punctured, the sides irregularly rounded, Length, .25-.32 in. Usually found on flowers, but has been bred from hickory, maple, ash, and dogwood.

CALLIMOXYS, Kraatz.

Distinguished from *Molorchus* by the shape of the elytra, which are longer and drawn out nearly to a point at tip. The sexes differ in colour, the males usually having a partially red thorax. *C. sanguinicollis*, Oliv., is blackish (except as stated above), punctured, the elytra more or less fuscous with clear punctuation. Anterior and middle legs entirely blackish, the posterior yellow except the tips of the joints, which are black. The hind tibiæ are long and curved in the males, the exterior margin with numerous teeth. Length, .33-.40 inch. Found on flowers in June and July.



FIG. 23.

ANCYLOCERA, Serv.

It may be that the Canadian record for *A. bicolor*, Oliv., is incorrect, since the species is said to be a resident of the Southern States from North Carolina to Texas. It is unknown to me in nature, but is said by Mr. Leng to be "a very dainty insect, black with scarlet elytra and abdomen and with slender legs and clubbed thighs. The body is slender, head short and prothorax very long as compared with the cylindrical elytra. The antennæ are serrate, one-half as long as the body in the female and longer than the same in the male. The hind pair of thighs is armed with a terminal spine." Length, .50-.70 inch.

BATYLE, Thoms.

B. ignicollis, Say, is from .28-.52 in. long, black, the prothorax bright red. The elytra are densely rugosely punctured, with blackish pubescence. The prothorax is rounded, unarmed, the pubescence longer than on the elytra. *B. suturalis* is smaller (.28-.36 in.), red, the legs

more or less black, the elytra often with a black line along the suture which may be dilated behind so as to extend over the greater part of the apical third. The prothorax is said to be occasionally black, but such specimens have never come under my notice. These beetles are often abundant on flowers on the Western plains of the United States.

PURPURICENUS, Serv.

Contains one species, *P. humeralis*, Fabr., a large insect, .50-.74 in. long, black, except a large triangular humeral spot on each elytron. Sides of prothorax spinose. Entire upper surface coarsely punctured, rugosely on the thorax, the elytral punctures distinctly and rather widely separated.

STENOSPHEENUS, Hald.

Here belongs *S. notatus*, Oliv., a rather elongate beetle of nearly parallel form, the elytra slightly tapering behind. In colour it is black, the head beneath and the entire prothorax except a large central dorsal black spot, reddish. The punctuation is rather coarse but sparse and each puncture gives rise to a gray hair, those of the elytra being subseriate in arrangement. The antennæ are spinose, equalling or exceeding the length of the body. Length, .35-.48 inch. Adults of this species have been cut from hickory wood.

CYLLENE, Newm.

The two Canadian species of this genus are difficult to separate since they agree almost exactly in colour. The numerous cross-bands of yellowish (or rarely grayish) pubescence on the velvety black prothorax and elytra give them a very characteristic appearance. Dr. Horn has distinguished them as follows:—

Second joint of hind tarsi glabrous at middle, antennæ of male longer than the body. .42-.89 in. *pictus*, Drury.

Second joint of hind tarsi densely pubescent, antennæ not longer than the body. Prosternum as wide as the coxal cavity. .40-.80 in. *robinia*, Forst.

The species differ in their times of emergence, *pictus* often appearing on its principal food-plant (hickory) early in spring, or even in winter if firewood of this sort be stored in a warm room. I have on one occasion seen several specimens copulating and ovipositing on felled honey-locust early in April at Iowa City. It also bores in butternut. *C. robinia* infests living black locust, often ruining the trees. It appears in late summer or early fall and may be found in great numbers on blossoms of golden-rod.

PLAGIONOTUS, Muls.

The soft-maple borer, *P. speciosus*, Say (fig. 24), is a most gaudy insect of large size (about an inch in length) and with heavier antennæ than most of its neighbors. The ground colour is black or nearly so, the legs reddish; but owing to the dense clothing of yellow pubescence very little of the black is visible. Almost the entire under surface is thus rendered yellow, as are also the legs, the greater part of the head, two short bands on each side of the prothorax, and several cross-bands on the elytra.

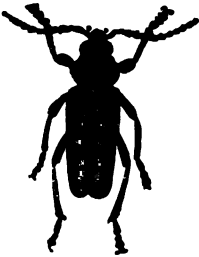


FIG. 24.

CALLOIDES, Læc.

Includes another large insect, *C. nobilis*, Harr., black, pubescent, usually decorated on the elytra with a few small detached yellow spots, which may, however, be absent. Length, .80-.92 in. It is thought to breed in the chestnut.

ARHOPALUS, Serv.

A. fulminans is said to breed in oak, butternut and chestnut. It is .48 to .72 inch long, black with whitish pubescence forming irregularly defined bands on the elytra and leaving on the prothorax a large central black spot with a smaller one on each side. The thoracic marking alone will thus serve as a ready means of recognition.

XYLOTRECHUS, Chev.

Includes several species which have the front of the head variably carinate; they are, for the most part, ornamented with transverse bands of lighter coloured pubescence, somewhat as in *Cyllene*.

- A. Prothorax with four spots of (usually yellow) pubescence. Elytral markings indistinct and not conspicuous. .32-.48 in. *quadrimaculatus*, Hald.

- AA. Prothorax not spotted (except by breaking up of bands), sometimes fasciate with pubescence.

- b. Elytra obliquely truncate at apex, the outer angle spiniform. Sides of prothorax regularly arcuate. .60-.72 in. *sagittatus*, Germ.

- bb. Elytra obliquely truncate at apex, but not spiniform.



FIG. 25.

- Thorax without apical and basal pubescent band.
 Elytral bands about as broad as their intervals.
 .32-.64 inch. (Fig. 25.).....*colonus*, Fabr.
 Thorax with apical and basal pubescent band. Median
 elytral bands angulated or undulatory. .44-.84
 inch.....*undulatus*, Say.

The above table is, in the main, taken from Mr. Leng's synopsis. He adds, regarding *undulatus*, that there may, for convenience in cabinet arrangement, "two names be retained: *fuscus*, Kirby, for the form with the sides of the thorax entirely covered with pubescent blotches and the elytral bands wavy, and *interruptus*, Lap. & Gory, for the form with the bands greatly obscured by the sprinkling of white hair." As to food-plants, *colonus* is known at attack oak and maple, while *undulatus* has been beaten from spruce. The latter is often very abundant on freshly cut pine logs or sawed timber.

PLAGITHMYSUS, Motsch.

This name is substituted for the *Neoclytus* of the Check List. The prothorax is transversely rugose, and by this character the genus may be readily distinguished from other Canadian Clytini. Mr. Leng separates the species substantially as follows:—

- A. Middle and hind femora spinose at apex.
 b. Thorax with a longitudinal elevated ridge, rugose at apex, antennæ filiform. Thorax with basal and apical bands only of pubescence; colour reddish brown, posterior two-thirds of elytra and parts of thorax often darker. .28-.76 in.....*luscus*, Fabr.
 bb. Thorax with a few distinct transverse rugæ, antennæ thickened toward apex. Blackish; head, thorax and legs reddish, elytra with straight transverse bands of yellow pubescence. .20-.70 in.....*erythrocephalus*, Fabr.
 AA. Femora not spinose, antennæ filiform, thorax with many strongly elevated but more or less confused transverse rugæ.
 c. Elytra rounded at apex, the bands yellow (rarely whitish), forming an oval figure at the base of each, behind which are two slightly oblique fasciæ. Tip yellow. .48-.80 in.....*caprea*, Say.

cc. Elytra truncate at tip. Smaller species with long legs and whitish elytral bands.

Thorax wider than long. .28-.40 in. *muricatus*, Kirby.

Thorax longer than wide. .36-.44 in. *longipes*, Kirby.

P. erythrocephalus is known to depredate on elm, soft maple, hickory and black locust; *P. caprea* on ash, elm and hickory, while *P. muricatus* and *P. longipes* may be taken on freshly cut pine.

CLYTANTHUS, Thoms.

C. ruricola, Oliv., is black, base of femora, the tibiae, tarsi and antennae (except at tip) reddish. Pubescence yellow, forming a nearly complete thoracic margin, a scutellar spot and elytral markings as follows: A short oblique band near the base, posterior to which is a hook-like (sometimes interrupted) figure the shaft of which is nearly parallel with the suture, and behind this a rather broad, nearly straight but oblique band. Beneath, the meso- and metathorax are spotted and the apices of the abdominal segments more or less margined with the same colour. Length, .28-.48 inch.

EUDERCES, Lec.

Contains two small (Canadian) species which agree in their ant-like form, the elytra gibbous at base and with an oblique ivory fascia. The colour varies from black to almost entirely rufous, the tip of the elytra, however, remaining black in the latter case. Mr. Leng separates them by the following characters:—

Eyes nearly divided; prothorax uniformly rounded at sides. .20-.36 in. *picipes*, Fabr.

Eyes completely divided; prothorax distinctly depressed each side near the anterior margin, laterally subangulate. .26-.36 in. *pini*, Oliv.

In my experience, *E. picipes* may be taken by beating hazel bushes. When running up the side of the beating-net the resemblance to certain black species of *Formica* (which are often abundant in the same thickets) is truly striking. It has been bred from chestnut twigs.

CYRTOPHORUS, Lec.

Until recently but one species has been recognized. Captain Casey has of late described another form which he distinguishes from *verrucosus* as follows:—

Larger, pronotum compressed, prominent along the middle, basal elevation of elytra strong. Third antennal joint strongly spinose.

.24-.40 in. *verrucosus*, Oliv.

Smaller, less convex, pronotum not compressed, basal elevation of elytra feeble, third antennal joint briefly spinoso-dentate within at apex. .24 in. *insinuans*, Cas.

These bear considerable resemblance in form to *Eudercus*, but are without the ivory-like band of the elytra. In colour the former is blackish; legs, in part, and basal three-fifths of elytra sometimes rufous, pubescence white or cinereous, arranged anteriorly in narrow oblique bands which follow the course of the basal elytral gibbosities. Behind these oblique bands is a very narrow cinereous one, nearly transverse in direction. Tip broadly covered with cinereous pubescence. I have not seen *C. insinuans*, which is described from a single male. Wild cherry is known to be a food-plant of *C. verrucosus*.

MICROCLYTUS, Lec.

M. gazellula, Hald., is found in the adult state on oaks. The genus differs from *Cyrtophorus* in not having the third antennal joint spinose at tip.* It is "a small insect, piceous or reddish-brown with the thorax above and the elytra, except about the middle of the suture, black and rather closely punctured, the legs and antennæ always paler. Elytral markings composed of long white hairs arranged as follows: An oblique line from the scutellum, a very short transverse or slightly arcuate line about the middle entirely distinct from the next, a broader band immediately behind and nearly transverse, a blotch covering the entire apical eighth of the length of the elytra." (Leng.) In the male the antennæ equal, in the female reach two-thirds the length of the body. In the former sex the elytral tips are very slightly truncate, in the latter separately rounded.

*Since publication of the table of genera I have come across the following note by Dr. Hamilton (CAN. ENT., XXIII., p. 63):—"The characters separating *Cyrtophorus* and *Microclytus* were originally feeble, and have recently become more so by some one discovering that the relative lengths of the antennal joints in the male of the latter are the same as in the former, thus leaving in the males only the presence or absence of a small spine at the end of the third joint of the antennæ as diagnostic." By a clerical error the legend *Cerambycoidea* is placed one line too high up on p. 86 of my table; it should be on line 2, and embraces all the genera from *Chion* to *Microclytus*, inclusive,

NOTES ON RHOPALOCERA, WITH DESCRIPTIONS OF NEW SPECIES AND VARIETIES.

BY HENRY SKINNER, M. D., PHILADELPHIA, PA.

I have received beautifully fresh specimens of *Argynnis atossa* taken in the mountains near Tehachapi, Southern California, July 7th, 1895. The inner half of the superiors below is bright red, almost a blood red. The species was described by Mr. Edwards from a specimen taken by Mr. H. K. Burrison. It is quite distinct and ranks with *diana*, *idalia* and *nokomis* as one of our handsomest Argynnids.

Argynnis Snyderi, n. sp.—♂. Expands three inches. Upper side: Superiors tawny as in other species, but dark and with considerable red. The black markings are distinct and sharply defined against the tawny background. The margin is distinctly but not heavily marked. The inferiors have the usual black markings, but they are unusually well defined and there are almost no black scales at base as in most species in the genus. Under side: Superiors have silver spots on outer margin, extending more than half way toward inner margin. There are two quite large subapical silver spots. On inferiors the silver spots are large and well defined, with wing-ground very light grayish-green with a distinct light buff intermediate border about one-eighth inch in width. Silver lunules on margin are large, well defined, and seven in number, the inner one extending up along inner margin as a line. The ground colour of wings on inferiors below is brownish in the female. This large species comes nearest *coronis*, and has been mistaken for it. I have specimens from Salt Lake City, Utah, taken June 23rd, 1895, and a female from Ogden, July 6th, 1895. All were taken by Prof. A. J. Snyder, after whom the species has been named.

Argynnis platina, n. sp.—♂. Expands two and a half inches. Upper side: Rather light tawny or even light buff. Black markings dense and wide, with outer halves of wings looking rather clear or open, with row of round spots not very large; marginal border light; bases of wings not much obscured. Under side: Superiors have the two subapical silver spots and silver spots on margin well defined; colour of inner half of wing rosy. Silver spots on inferiors are large and well defined and placed on a very light greenish-gray ground. The intermediate buff band is well defined, comparatively wide and very light in colour. Ground colour on inferiors below is reddish brown in the female. Described from specimens taken at Ogden, Utah, between July 18th and 24th, and Beaver Canon, Idaho, at nearly same dates. From Prof. A. J. Snyder.

The typical *Arg. nevadensis* comes from Nevada, and the types came from the valleys of the Sierra, near Virginia City. I have specimens from Reno and Verdi, Nevada. I mention this as I do not think the specimens from Colorado and Utah are typical but are var. *Meadii*, or more nearly related to that variety. I have females from Mammoth Hot Springs which are the colour of *leto* ♀. The species figured in Ent. News, pl. 2, 1892, is not *chariclea* but *polaris*. The other Greenland *Argynnis* brought back by the Peary expedition is *chariclea*, var. *artica*, Zett.

Melitaea Beani.—I propose this name for the Alpine form of *anicia* from the high elevations near Laggan, Alberta, the fauna of which has been so assiduously studied by Mr. Thos. E. Bean, and who has made known new species and interesting facts in regard to the butterflies of that region. This variety has quite a different appearance from the low valley form, being darker, smaller, and with markings apparently run together more and not nearly so bright in colour. Expanse of *Beani* $1\frac{5}{16}$ inch. Expanse of low valley form $1\frac{11}{16}$ inch. I have specimens of *Melitaea alma*, Strecker, from Coso Valley, Cal.; May. Types came from Arizona and South Utah.

Phyciodes Barnesi, n. sp.—♂. Expands $1\frac{3}{4}$ inch. Shape and colour of *P. mylitta*. Superiors light tawny with less markings than any known species. Superiors have an eight-shaped mark in cell near base of wing; just below this is another better defined eight-shaped mark; in centre of cell is a small naught-shaped mark; below this on inner margin is a good-sized black spot; there is a black bar at end of cell and another black bar near angle of wing; the remainder of the wing is practically immaculate. Inferiors have a number of black lines extending out from base for about one-fourth inch; remainder of wing except margin is nearly immaculate, except that the markings on under side can be faintly seen. Under side: Superiors much as above. Inferiors have the markings as is usual, but are not so well defined and are quite light in colour. Specimens were taken at Glenwood Springs, Colo., May 8th to 15th, and June 1st to 7th, by Dr. Wm. Barnes, in whose collection are many co-types.

I have specimens of *Junonia cenia*, var. *negra* (Feld. Reise Nov. Lep., 3, 399, n. 592, 1867) from S. E. Texas; Coleina, Mex.; Merchantville, N. J. (Kemp).

Cænonympha (Erebia) Haydenii—♀. This differs markedly from the ♂ in being entirely different in colour. Males are dark smoky-brown, and the females are nearly same colour as *Cæn. inornata* but not so reddish. This species was found in numbers by Prof. Snyder at Beaver Canon, Idaho, last of July and first part of August, 1895.

Thecla damon, n. var. *discoidalis*.—Differs from typical form in having central area of both wings light greenish-yellow. Round Mountain, Blanco Co., Texas, February 10th and August 16th.

Pieris ochsenheimeri, Staudinger (Stett. Ent., Zeit., 1886, p. 199). This species was described by Dr. Staudinger from Central Asia, and is beautifully figured in "Mémoires sur les Lépidoptères" by N. M. Romanoff, 4, 220, pl. 14, f. 1 a, b, 1890. Through the generosity of Dr. Herman Strecker, of Reading, Penna., I received two males and a female of a *Pieris* unknown to me from Mt. Wrangel, Alaska. They prove to be the above-mentioned species. As Romanoff's work may not be accessible to many, I append the following description:—

♂.—Expands $1\frac{1}{16}$ inch. Upper side: Superiors white with costa blackish-gray; apical costa, apical portion of wing and upper part of outer margin blackish. There is a round black spot in the space between last costal and first discoidal nervure. Neuration shows faintly gray scales. Bars of wing black. Inferiors white with only one spot and that on outer third of costa, round, black. Base of wings black; there is a very narrow, dark, submarginal line to both superiors and inferiors. Under side: Superiors much as above except that apices of wings are yellowish, and there is an additional spot (not always well defined) below the third discoidal nervure. Inferiors have mixed yellow and gray spots as in *Pieris napi bryoniae*. The female differs from the male in having the veins rather heavily marked with dark scales, as are also the apices of superiors and bases of all four wings. It has an additional dark spot on superiors. Below the veins are not as heavily marked and the ground colour of wings is white instead of yellow.

Systasea pulverulenta, Feld.—I have received a specimen of this species from Prof. T. D. A. Cockerell, who sends the following particulars: "Caught April 22nd at Mesilla, New Mexico, on flowers of *Biscutella Wislizenii*. It is different from any Hesperid I have caught here. When I saw it I thought it was a moth near to *Drasteria*."

SOME NEW AND LITTLE-KNOWN DORYDINI (JASSINÆ).

BY C. F. BAKER, AUBURN, ALA.

Spangbergiella vulnerata, Uhler.—There are two specimens of this species in the National Museum collection from New York, and another in Fitch collection from Arkansas.

Spangbergiella Lynchii, Berg.—Signoret quotes the description of this species in his *Essai sur les Jassides* and says: "This species might well be the *S. vulneratus*." Berg takes this suggestion as the final disposition of the species, and reduces *Lynchii* to a synonym of *vulnerata*. I have a specimen of what is undoubtedly this species, from the Herbert H. Smith collection taken at Corumba. While it is very near *vulnerata*, still I think it should retain its place as a good species. It differs from *vulnerata* in having the head more slender, vertex a fourth longer than width between the eyes, the red lines not reaching the middle. In North American specimens of *vulnerata* (and so figured by Signoret) the vertex is but little if any longer than broad between the eyes, and the red lines converge considerably beyond the middle—at the tip as figured by Signoret.

Spangbergiella mexicana, n. sp.—♀. Length, 6.5 mm. Pale green, darker on vertex, pronotum, and bases of abdominal segments. Two oblique slender red lines on vertex, converging towards the tip, which they do not quite reach. Pronotum with two red lines extending its whole length, nearly in line with those on vertex, at its base with a median yellowish dash. Scutell immaculate. Elytra whitish towards the tips; claval suture and all veins except apical, yellow. A black dot at end of claval suture, and one each at end of first and fourth apical veins.

Vertex triangular, obtusely angulate anteriorly, but little longer than breadth between the eyes, about a fourth longer than pronotum. Clypeus subrectangular, broadly rounded at tip. Pronotum twice as wide as long. Ovipositor two-thirds length of rest of venter, exceeding the elytra by $\frac{1}{2}$ mm. Last ventral segment a half longer than preceding, hind margin truncate.

Described from a single female collected at Vera Cruz, Mexico, by Rev. H. Th. Heyde. This species is nearly related to *S. punctato-guttata* and *S. felix*, but is distinct from both as described above.

Bergiella, n. gen. Type, *Parabolocratus uruguayensis*, Berg.—The head is broader than long, somewhat angulate and sloping as in *Parabolocratus*. The frontal sutures are arrested at the antennal scrobes. The

clavus has but a single longitudinal vein. A specimen of this species, collected at Chapada, is in the H. H. Smith collection. I name this genus in honour of the author of "Hemiptera Argentina."

Parabolocratas flavidus, Sign.—This species, described from North America, was omitted from the Van Duzee List. There are specimens in the National Museum from Texas. I have also collected it at Auburn, Ala.

Paraphlepsius, n. gen.—Head about the same width as the prothorax and considerably shorter, three and a half times as broad as long, anteriorly foliaceous, angulate, vertex level. Face of the normal Jassid type. Frontal sutures continued to the edge of vertex. Ocelli on the edge between vertex and face, somewhat removed from the eyes. Elytra broad, slightly exceeding abdomen, bluntly rounded at tip, with a narrow appendix. Apical cells four, antepical two, basal transverse vein entering radial cell. Clavus with two longitudinal veins. Wings with three apical cells exclusive of the closed costal.

This genus is nearest to *Psegmatus*, Fieber, from which it differs in having the head broader and much shorter than pronotum, and the frontal sutures nearly straight, instead of strongly bent inward, as in *Psegmatus*. Type :—

Paraphlepsius ramosus, n. sp.—♀ ♂. Length, 7 mm. Robust. Thickly marked with fine brownish dots and ramose lines. Face and below brown, the face marked with numerous yellowish dots. Legs yellowish, annulate with dark brown. Vertex and pronotum brownish, with numerous small, partly confluent whitish dots, which are larger on the latter. Elytra whitish translucent, with very numerous brown ramose lines adjoining the veins and in the cells; in the female a large irregular clearer space towards base; in the male this clearer space is more pronounced, and there are small clear spots in several of the cells, the ramose lines becoming darker in a broad transverse band at middle of elytra.

Genæ broadly angularly emarginate below the eyes, the succeeding angle very obtuse, beyond attaining the tip of the clypeus. Loræ large, semilunar. Clypeus trapezoidal, narrower at base, truncate at tip. Front rapidly broadening above, apex rather abruptly bent forward, sides nearly straight. Width of vertex between eyes two and a half times the length; length about two-thirds that of pronotum. Pronotum two and one-third times as wide as long, broadly rounded anteriorly, hind margin gently concave; posteriorly the surface is rather coarsely, subobsoletely creased.

Last ventral segment of female twice the length of the preceding, shallowly trisinate, the median sinus acute.

Described from two specimens from the Cornell University collection, kindly sent me by Mr. A. D. Macgillivray, collected at Ithaca, N. Y., the female on Aug. 3rd, 1889. This insect might readily be mistaken for a *Phlepsius*.

Dorydiella, n. gen.—Head broader than prothorax and somewhat longer, more than twice as broad as long, anteriorly foliaceous, angulate, and inclined upward. Face normal. Ocelli on the edge between vertex and face, adjoining the eyes. Elytra long and narrow, with a narrow appendix, somewhat exceeding abdomen, toward the apex narrowed to an acute point. Apical cells four, anteapical two, basal cross vein entering radial cell. Clavus with two longitudinal veins. Wings with three apical cells exclusive of the closed costal.

This genus is much like *Dorydium* in everything except the head, which is far shorter. Type:—

Dorydiella floridana, n. sp.—♀. Length, 8 mm. Pale sordid whitish. Face variously marked with fine light brown dots, leaving portions below, and several indistinct transverse bands above, light. Vertex and pronotum with a number of very pale brownish indistinct longitudinal stripes. Anterior edge of vertex with five dark dots. Elytra with very sparse brownish ramose lines, densest about and extending back from the second apical cell. A dark spot at apex of clavus.

Genæ feebly emarginate below the eyes, then broadly rounded, slightly exceeding clypeus. Loræ large, semilunar. Clypeus somewhat narrower towards base, sides sinuate, apex truncate. Front with sides nearly straight, rapidly broadened above where it is bent somewhat back. Length of vertex three-fourths of width between eyes, somewhat longer than pronotum. Pronotal width nearly two and a third times the length; anteriorly the pronotum is broadly rounded, the surface very sparsely punctate and posteriorly finely creased, the hind margin gently concave. Last ventral segment but little longer than preceding, hind margin with a broad, blunt, median projection having a small notch at its extremity and a black dot on either side.

Described from a single specimen in the National Museum collection, labelled "Fla." It is to be hoped that collectors doing miscellaneous sweeping in Florida will look particularly for further specimens of this rare and interesting insect.

CORRESPONDENCE.

BROTIS VULNERARIA AGAIN.

One of the many fine things secured by Mr. Bice at electric light during the season of 1896 was a specimen of that perplexing aberrant Lepidopteron, *Brotis vulneraria*, Hub.

In the CANADIAN ENTOMOLOGIST for 1886, Vol. XVIII., page 72, Mr. Ph. Fischer reports the capture of a specimen in Buffalo at electric light and gives some description of it and an account of the difficulty experienced by the various authors to decide its position in systematic classification. At page 136 the Rev. G. D. Hulst comments on that report and gives further information upon the subject, and quotes Walker as saying that "it does not seem to fit well anywhere."

Mr. Fischer identified his specimen by Hubner's figure. I had no difficulty in recognizing the London specimen by Guenée's illustration of it in his *Lepidopteres Phalénites*, plate 22, fig. 9, under the generic name *Sphacelodes*, but was indebted to Dr. J. B. Smith for a clue to its location in his List of 1891. I had forgotten these notices, where Dr. Hulst gives its generic synonymy, and the cause of it, although I read them with interest mingled with curiosity at the time, knowing nothing whatever of the moth referred to.

It is an interestingly anomalous insect. Whether in a tropical collection it has fitting associates with which it may harmonize and bear a resemblance, it certainly stands out conspicuously distinct in the Ontario one to which Mr. Bice has kindly donated it. J. ALSTON MOFFAT.

PODISUS PLACIDUS.

In the May number of this journal Mr. Kirkland, of the Gypsy Moth Committee, publishes the descriptions of two Pentatomids by Mr. Uhler—*Podisus placidus* and *Euschistus politus*. Of *Podisus placidus* he says he was unable to find the original description, nor could Prof. Uhler at the time give him the reference. This description may be found in the American Entomologist, Vol. II., page 203. E. P. VAN DUZEE.

Buffalo, N. Y.

ERRATUM.—On page 101, seventh line from bottom, for DORYLIDÆ read MYRMICIDÆ.

Mailed June 4th, 1897.





THE COLUMBINE BORER, *HYDROECIA*
PURPURIFASCIA, G. & R.

The Canadian Entomologist.

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THE COLUMBINE BORER (*HYDROECIA PURPURIFASCIA*, G. & R.).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In 1894, Mrs. J. J. Glessner, Littleton, N. H., called my attention to a "worm" which was feeding in the roots and stems of her columbines. It was not until July, 1895, however, that she succeeded in getting specimens of the "worm" for me. The "worm" proved to be a caterpillar which was unfamiliar to me, and in accordance with my usual practice in such cases, it was described and photographed. The photographs, giving dorsal and lateral views of the caterpillar, twice natural size, are reproduced on the plate.

The full-grown larva measured one and three-eighths inches in length. Its general colour is mars brown, much lighter on the venter of the first two thoracic and last four or five abdominal segments. The head is of a light russet colour, black about the eye-spots. Mandibles dark brown, black-tipped. Thoracic shield concolorous with the head on the dorsum, but merging into black on the sides and sometimes into a narrow black cephalic border; the shield is divided by a narrow whitish mesial line. Anal shield large, black, merging into brown mesially. The true legs are brownish-black, and the bases of the pro-legs are marked with blackish areas. Short light brown hairs arise from conspicuous, comparatively large blackish spots; the piliferous spots on the dorsum of the last two abdominal segments are considerably larger than the others. The spiracles are black. There is a continuous narrow white mesial stripe extending along the dorsum. A similar white stripe extends along the subdorsum on each side, but it is not continuous, being entirely obsolete on the first four abdominal segments, and sometimes on the last thoracic segment also. The discontinuance of these two white side stripes gives the larva a rather curious appearance, as the figures show.

One of the caterpillars, which was received in the latter part of July, 1895, pupated on or about August 8, and the adult insect (the beautiful moth shown twice natural size on the plate) emerged September 3, 1895.

The moth proved to be the one described by Grote and Robinson in 1868 as *purpurifascia*. Imagine the light spots in the figure to be of a delicate creamy white colour, the other shades as various shades of orange, purple, and russet brown, and you will have a faint 'conception of the rather uncommon but beautiful combination of colours presented on the wings of this insect.

I can find no reference in the literature to the early stages or habits of this insect. On account of its destructive work in Mrs. Glessner's columbines, it may be appropriately called "the Columbine borer." The moth has been recorded as occurring in Maine and Massachusetts in September and October, and in New York in August; it is also known to occur in Illinois and Colorado. Mrs. Glessner writes that she has found that rich soil, cultivation, and Fowler's solution of arsenic (diluted one-half with water) poured around affected plants seemed to check and control the pest.

THE RASPBERRY-CANE MAGGOT (*PHORBIA RUBIVORA*, COQUILLETT).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

This new raspberry pest has been discussed in detail in Bulletin 126, issued in February, 1897, from the Cornell Agricultural Experiment Station. The life-history and habits of this Anthomyiid are fully illustrated in the Bulletin. At the time the Bulletin was written, however, the name of the insect had not been determined. In April, 1897, I reared several more of the flies and sent some to Mr. D. W. Coquillett at Washington. He soon reported that the insect was a new species of *Phorbia*, and sent me the following technical description of the fly, which he had drawn up from the specimens I sent him.

Phorbia rubivora, Coquillett, n. sp.—♂. Ground colour black; sides of front and of face white pollinose, eyes sub-contiguous, more approximated to each other than are the two posterior ocelli, frontal vitta at the narrowest part linear; third antennal joint less than twice as long as broad, slightly over twice as long as the second, arista thickened on the basal third, the penultimate joint slightly longer than broad. Thorax grayish pollinose, marked with three black vittæ; three postsutural and three sterno-pleural macrochætæ. Abdomen quite thickly covered with suberect bristly hairs; narrow, subcylindrical, greenish-gray pollinose,

marked with a black dorsal vitta; tip of abdomen greatly swollen, bearing a subconical process in front of the hypopygium. Front and middle tibiae each bearing two bristles on the posterior and one on the outer side below the middle besides those at the tip, hind tibiae each bearing a single bristle on the inner side near the lowest third, three on the front side and two on the outer side, in addition to those at the tip; under side of each hind femur bearing a row of bristles, those at the base the shortest. Wings hyaline, tinged with gray at the base and less distinctly so in the marginal cell, costa strongly arcuate along the costal cell, costal spine shorter than the small cross vein, the latter beyond the middle of the discal cell, hind cross vein nearly straight and subperpendicular, last sections of the third and fourth veins distinctly diverging; calypteres whitish, halteres yellow, the extreme base of the peduncle brown.

♀. Front three-fourths as wide as either eye, frontal vitta destitute of a pair of macrochaetae, sides of front yellowish-gray pollinose; abdomen ovate, pointed at the apex, almost bare, destitute of a black dorsal vitta; costal spine slightly longer than the small cross vein; otherwise as in the male.

Length, 4 to 5.5 mm. Two males and two females, bred by Mr. M. V. Slingerland, from larvae boring in the stems of the cultivated raspberry at Ithaca, N. Y.

The male will be easily recognized by the narrow abdomen and the arrangement of the bristles on the legs; the female, by the absence of the usual pair of macrochaetae on the upper part of the frontal vitta.

D. W. COQUILLET.

Mr. R. H. Meade, of England, sends me the following report upon some of the flies which were sent to him at the same time: "I have examined the flies carefully, and they seem to be an undescribed species of *Phorbia*. I cannot identify them with any European species that I know, and I think you may describe them as new. You might call them *P. rubi* or *P. ruborum*."

I shall be glad to send a copy of Bulletin 126 to anyone who may be further interested in this raspberry-cane maggot.

The annual meeting of the Association of Economic Entomologists will be held at Detroit, Mich., on Thursday and Friday, August 12th and 13th.

PRELIMINARY STUDIES OF N. AMERICAN GOMPHINÆ.

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.

Examples of the emphasized importance of larval life better than that furnished by the subfamily Gomphinæ of Odonata are few even among insects. The nymphs live under the sediment (mostly organic debris) which falls to the bottom of ponds and streams. They are aquatic burrowers which live at such slight depth that their anal respiratory orifice is never beyond the reach of clean water. This thin stratum, which forms their home and which they only leave to transform, is one of great biologic richness. In it they have found room for development in enormous numbers and necessity for extreme specialization. They are, at least when well-grown, among the more powerful members of its teeming hidden population. The imagoes emerge, flit about under cover for a few days, lay their eggs and die. They emerge largely by daylight and are subject to great decimation of numbers at this time, and are sought later by numerous powerful enemies. The females which live to oviposit lay a very large number of eggs. A female of *Gomphus fraternus* laid for me in a watch glass of water over 5,000 at one time. The imagoes of the ancient genus *Gomphus* are regarded as a race of weaklings. Their nymphs, on the contrary, are splendidly equipped for the battle of life. And it is to the perfection of their adaptation that the prevalence of Gomphines with us is due.

These conditions have developed a large and very uniform series of imagoes, with one colour pattern, one plan of venation, one *habitus*, consisting of many very closely related species difficult to study. Specific characters, though slight, are yet constant. The slight specific variations of an ancient colour pattern long retained are unusually reliable. Secondary sexual characters reach here their maximum of importance and of specific individuality. This is as one would expect, recalling the vicissitudes of adult life and that its chief concern is with reproduction.

The real competition of life, however, is carried on by the nymphs, and the outcome of it is that they have become specialized. They have developed along several lines and have become segregated into well-marked natural groups which are not so obvious among the imagoes.

De Selys separated from the great genus *Gomphus** as he found it three genera represented in our fauna, *Ophiogomphus*, *Herpetogomphus* and *Dromogomphus*, and divided the remainder into groups of species. My breedings of the nymphs during the past three seasons in the main confirm these groups and show that three of them at least are worthy to rank as genera.

One of the genuine surprises of this season was the finding here, at Ithaca, of nymphs like those described by Hagen from Rocky Creek, Ky., (Trans. Amer. Ent. Soc., XII., 281, 1885) and doubtfully referred by him to *Tachaptryx Thoreyi*, and the rearing from them of *Gomphus parvulus*, Selys. "This extraordinary nymph combines head and antennae of *Hagenius* with legs and abdomen of *Gomphus*," wrote Hagen in the beginning of his very careful description. The length of the wing pads showed the nymphs not to be young, as Hagen supposed, and made it impossible to consider them as belonging to *Tachaptryx*, but that they should yield this dainty little Gomphine was still a surprise.

In June and July, 1896, I bred *Gomphus fraternus*, Say, in numbers at Havana, Ill. The nymphs are exactly described by Hagen (loc. cit., p. 262) as No. 13, *G. adelphus* (supposition). In May, 1895, I bred *Gomphus graslinellus*, Walsh, at Galesburg, Ill. These, especially the former, are very near to the typical *G. vulgatissimus* of Europe.

**Nomenclatural*.—In the case of *Aeshna* vs. *Gomphus* I have examined the evidence and find it is as follows: Linne included all dragonflies known to him in one genus, *Libellula*. Fabricius (1775. Syst. Ent., pp. 420-426) divided the genus into three, *Libellula*, L., *Aeshna*, Fabr., and *Agrion*, Fabr., placing under *Aeshna*, among other species, *L. grandis*, L., and *L. forcipata*, L. It is worthy of note that he left *L. vulgatissima*, L., in *Libellula*. Illiger (1802. Magazin für Insekten Kunde, p. 126) corrected the spelling to *Aeschna*, merely to accord with its etymology. Latreille was the first to designate types. He specifies (1802. Hist. Nat. Gust., Ms. III., 286) *L. depressa*, L., as the type of *Libellula*; *L. vulgatissima*, L., as the type of *Aeshna*, and *L. virgo* as the type of *Agrion*. With regard to the second, which alone concerns us here, *L. vulgatissima*, L., was described and figured by Latreille under the name "*Aeshna forcipata*, Fabr.," as was shown later by both Hagen and De Selys. Kirby's Catalogue of Neuroptera Odonata (1890) gives the correct synonymy and thus contains in itself the evidence which condemns the substitution it proposes. For if the type named by Latreille for *Aeshna* was *vulgatissima*, L., this species having been excluded by Fabricius when he founded the genus, cannot be its type. Leach (1815. Edinburgh Encycl. VIII. part 2, p. 726, of Amer. reprint) founded the genus *Gomphus*, with *L. vulgatissima* L., for its type and placed under *Aeshna*, Fabr., the sole species *L. grandis*, L. However, Cuvier had previously (1798) characterized *Aeshna* (as pointed out by De Selys, C. R. Ent. Soc. Belg., 1890, p. CLXI.) and described under it the sole species *grandis*, L. This usage has since been universally followed until 1890, and one is glad to find there is now no reason for change.

I follow De Selys in using the name *Ophiogomphus*, Sel., which seems to have been quite properly given,

In the *pallidus* group I find another type of nymph very distinct in the two species I have reared (*pallidus*, Ramb., at Galesburg, Ill., May 1895; *villossipes*, Sel., Ithaca, N. Y., May 1897).

The *plagiatus* and *notatus* groups of De Selys together present another type of nymph, already pointed out by Hagen (loc. cit., p. 269) as perhaps of more than subgeneric value. The bred nymphs of this group are of *plagiatus*, Sel., *notatus*, Ramb., *spiniceps*, Walsh, and *segregans*, n. sp. (vid. sub finem.)

Believing that the immature stages throw much light on the relationship of the imagoes, and that the study of this large and homogeneous group will be facilitated by the setting apart of distinguishable sub-groups, I propose three new genera which need here have no further characterization than that of the following tables: *Lanthus* (λανθάνη contracted), type *G. parvulus*, Selys, *Orcus* (nomen proprium), type *pallidus*, Ramb., and *Stylurus* (στύλος and οἶμα), type *plagiatus*, Selys. With these apart *Gomphus* is still somewhat polymorphic. The *dilatatus* group, characterized by extreme dilatation of the apex of the abdomen in the imago and correspondingly greater width to the 9th abdominal segment in the nymph, may yet, with advantage, be set apart. A clear line of demarcation, however, is not yet apparent.

I now hazard a table for separating these subdivisions of the *Legion Gomphus*, Selys. It is to be regarded as preliminary and tentative, the more so as I have endeavored to base it on characters common to both sexes. This legion is distinguished from others of Gomphinae by the absence (normally) of cross veins from all the triangles and supra-triangular spaces.

TABLE FOR IMAGOS OF THE LEGION GOMPHUS, SELYS.

1. Outer side of triangle of fore wing distinctly angulated at the origin of the cross vein between the two upper discoidal areolets.....2.
- Outer side of triangle of fore wing straight or nearly so.....3.
2. Inferior abdominal appendages of ♂ recurved upward in their apical half; vulvar lamina of ♀ shorter than half the 9th abdominal segment *Herpetogomphus*, Selys.
- Inferior abdominal appendages of ♂ recurved upward only at their extreme apices; vulvar lamina of ♀ almost equalling the 9th segment..... *Ophiogomphus*, Selys.

3. Upper sector of the arculus arising from its upper end; *i. e.*, the part of the arculus above the sectors shorter than the part below them..... *Lanthus*, gen. nov.

Upper sector of arculus arising from its middle; *i. e.*, the part of the arculus above the sectors longer than the part below them.....4.

4. Hind femora with 5 to 7 long spines intermixed with smaller ones..... *Dromogomphus*, Selys.

Hind femora with numerous shorter spines.....5.

5. Ninth abdominal segment a little longer than 8th. Segments 7, 8 and 9 very little enlarged.....6.

Ninth abdominal segment not longer, generally shorter, than the 8th; segments 7-9 more or less enlarged.... *Gomphus*, Leach.

6. Dorsum of thorax pale with darker stripes; 8th abdominal segment cut obliquely at apex, longer on the dorsum than at the sides. abdominal appendages of ♀ hardly longer than the 10th segment..... *Orcus*, gen. nov.

Dorsum of thorax dark with paler stripes; 8th abdominal segment not longer on the dorsum than at the sides; abdominal appendages of the ♀ at least one half longer than the 10th segment..... *Stylurus*, gen. nov.

Nymphs of four of our N. American Gomphine genera remain to be discovered. *Tachaptryx* and *Dromogomphus* of the eastern U. S., *Gomphoides* of Texas and *Octogomphus* of California. I venture now a preliminary table for our known nymphs. Doubtless many modifications of it will be necessary as the unknown nymphs still largely in the majority are discovered.

TABLE FOR GOMPHINE NYMPHS.

1. Wing-cases strongly divergent.....*2.
Wing-cases laid parallel along the back.....4.

*This will not apply to gaping *exuviae* in which originally parallel wing-cases have been forced apart

2. One third or more of the length of the abdomen, formed by the 10th abdominal segment.....(supposition). *Aphylla*.
Tenth abdominal segments not longer than the other segments...3.
3. Middle legs less distant at base than fore legs.....*Progomphus*.
Middle legs not less distant at base than fore legs.....(These apparently not separable) *Herpetogomphus* and *Ophiogomphus*.
4. Third joint of antennæ flat, circular5.
Third joint of antennæ cylindric, at least twice as long as wide...6.
5. Abdomen flat, subcircular*Hagenius*.
Abdomen ovate, twice as long as wide*Lanthus*.
6. Abdominal appendages longer than the 10th segment, front border of median lobe of labium straight (or in *Gomphus* occasionally very slightly rounded), with the usual fringe of flat scales, but without teeth. Abdomen not abruptly narrowed before 9th segment.....7.
Abdominal appendages shorter than the 10th segment; front border of median labial lobe produced into a prominent rounded lobe which is generally armed with a conic apical tooth. Abdomen rather abruptly narrowed to the base of its 9th segment, more slowly tapering to the apex.....*Orcus*.
Body spindle-shaped, little flattened; fore and middle tibiæ with small external apical hooks or with none*Stylurus*.
- Ninth abdominal segment one half longer than the 8th, its lateral margins nearly parallel. A minute middorsal apical spine on the 9th segment only. Lateral lobe of the labium with a strongly incurved end hook and teeth on the inner margin increasing in size posteriorly.
Body flat, lanceolate; fore and middle tibiæ with strong external apical burrowing hooks. Ninth abdominal segment hardly longer than the 8th, much narrowed posteriorly. Rudimentary dorsal hooks on some of the segments before the 9th.*Gomphus*.

(To be continued.)

Gomphus

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXV. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(Continued.)

ATIMIA, Hald.

Represented by *A. confusa*, Say, the only Canadian species of the group Atimioides. Aside from the structural peculiarities given in the table of genera, it may be characterized by the blackish colour and the punctate surface clothed with rather long yellowish pubescence, which is irregularly disposed so as to leave abraded smooth spots. The elytra are broader than prothorax, truncate at tip. Length, .33-.40 inch.

NECYDALIS, Linn.

This genus, by the short elytra, bears some resemblance to *Molorchus*. The third and fourth antennal joints together are distinctly longer than the fifth. Our species is *N. mellitus*, Say, unknown to me, but described by Mr. Leng as being of variable colour, "usually rufo-testaceous, head, antennæ (base and tip tinged with rufous), thorax, scutellum and abdomen above black; elytra punctate, more coarsely toward the margin; reddish-brown, with paler spot at tip or entirely rufo-testaceous." The elytra are marked by an oblique impression which is not deep and does not reach the tip. Length, .60-.84 inch.

DESMOCERUS, Serv.

D. palliatus, Forst., is found on the elder (*Sambucus*) in July. It is a very showy beetle, with narrow head, deeply impressed above, bell-shaped prothorax, and faintly costate elytra. Colour blue except the base of the elytra, which is broadly orange or yellow. Length, .70-.90 inch. This insect can be mistaken for no other Longhorn.

TOXOTUS, Serv.

"This genus is sharply defined by the spurs of the hind tibiæ, which are inserted at the base of a deep excavation instead of at the extreme end."—(Leng.) This character is of easy verification, and is in itself sufficient for the separation of *Toxotus* from other Lepturoides. A modification of Mr. Leng's table may be used for the Canadian forms.

A. Elytra striped, black with marginal and discal yellowish vitta. .60-.68 in *trivittatus*, Say.

AA. Elytra unicolorous or nearly so.

- b. Third joint of antennæ much longer than the fourth.

Larger species, legs bicoloured. .76-1.00 in. .*Schaumii*, Lec.

Smaller species, legs unicoloured. .40-.60 in. .*vestitus*, Hald.

- bb. Third joint of antennæ but slightly longer than the fourth.

Tips of elytra obliquely truncate, sub-bidentate. .87-.90

in. *cylicollis*, Say.

The name *trivittatus* replaces that of *vittiger* in accordance with the synonymy proposed by Mr. Leng.

RHAGIUM, Fabr.

R. lineatum, Oliv., is often common under pine bark or in lumber piles. It has scarcely the appearance of being a Longhorn at all, the antennæ being so short as to usually fail of attaining the base of the elytra. The prothorax is much narrower than the elytra, armed on each side with a strong spine or acute tubercle. The elytra are narrowed behind, sharply costate. In colour the insect is black or nearly so, the prothorax appearing gray from the pubescence which clothes it, excepting a smooth stripe on each side (including the spine) and one on the median line. The elytra are marked by a few reddish or yellowish spots, and the pubescence is irregular, giving a mottled appearance. Length, .54-.80 inch. My small specimens are from the Lake Superior region, while the large ones came from the forests of the mountains of Arizona.

CENTRODERA, Lec.

A large species, *decolorata*, Harr. (Fig. 26), is our only representative. The head, prothorax, under surface and appendages are reddish-brown, the elytra lighter. The eyes are more prominent than usual, the prothorax shining, nearly smooth at middle, closely punctate and somewhat opaque at sides, lateral tubercle large and acute. Elytral punctuation coarse at base, becoming finer to tip, sides nearly parallel. Mr. Leng describes the antennæ as "about as long as the body," but they may fall one-third or more shorter. Length, 1.20 to 1.25 inch. Rather rare. Found on beech by Mr. Harrington.



FIG. 26.

PACHYTA, Serv.

- A. Elytra reticulate with raised smooth lines, the intermediate spaces coarsely punctured. Black, subæneous, antennæ, femora and base of tibiæ ferruginous. .51-.64 in. *rugipennis*, Newm.

AA. Elytra simply punctured.

Punctuation finer, surface of elytra finely pubescent, opaque or nearly so. Black, legs and antennæ often reddish, elytra yellow, four spots on each and tip black. .35-.38 in. *monticola*, Rand.

Punctuation coarse, surface of elytra glabrous, shining, colour black, elytra sometimes testaceous, or more or less distinctly maculate with black. .60-.72 in. *liturata*, Kirby.

I am unacquainted with *P. rugipennis*, and the description is taken from Mr. Leng's synopsis. *P. monticola* is to be found on blossoms of wild rose, while I have taken *liturata* in numbers on piles of sawed pine lumber.

ANTHOPHILAX, Lec.

Three Canadian species are recorded, only one of which, *A. attenuatus*, Hald., is known to me. The others, *A. viridis*, Lec., and *A. malachitus*, Hald., are suspected by Dr. Horn to be respectively the ♀ and ♂ of one species. Following his table they separate thus: all belonging to that section of the genus in which the antennæ are slender, the third joint much longer than the fourth.

"Elytra coarsely punctate scabrous, more or less metallic.

Elytra greenish-blue, legs black. .70 in. *viridis*, ♀.

Elytra cupreo-æneous to blue, legs pale. .52 in. *malachitus*, ♂.

Elytra testaceous, irregularly maculate with piceous spots. Surface coarsely sparsely punctate and with small spaces which are distinctly pubescent; median line of thorax distinctly impressed. .56 in. *attenuatus*."

Mr. W. H. Harrington has taken the last mentioned insect at Ottawa on beech.

ACMÆOPS, Lec.

Only two species, *pratensis* and *proteus*, are recorded in the Society's lists and additions. I have, however, seen *bivittata* with the label "Quebec," and recently Mr. Chagnon sent a specimen of *subpilosa* as coming from Montreal; *longicornis* is known from the far north of Canada, and is included in the subjoined table, which is in the main equivalent to those prepared by Dr. Leconte and Mr. Leng.

A. Front and mouth much prolonged, body moderately robust, prothorax bell-shaped, sides sinuate but not tuberculate. Black, elytra variable, either blackish, reddish or clouded, occasionally indistinctly vittate. .24-.34 in. *pratensis*, Laich.

AA. Front not greatly prolonged.

b. Body short and stout, antennæ thicker, hind tarsi stout, the joints 1-3 equally pubescent beneath. Prothoracic tubercle distinct, elytra closely punctured. Colour varying from entirely black to almost entirely testaceous; or the thorax may be yellowish while the elytra are black. Typical form has yellowish elytra, each with two black stripes. .24-.36 in. *bivittata*, Say.

bb. Body more slender, antennæ more delicate, hind tarsi slender, pubescence wholly or in part lacking beneath on second and sometimes on first joint.

c. Disk of prothorax convex, slightly channeled, densely punctured.

Prothorax longer than wide, elytra rather sparsely punctured, pubescence short and scant. Colour extremely variable, black to testaceous, elytra often vittate. .36-.44 in. *longicornis*, Kby.

Prothorax broader than long; blackish, pubescence very long. .36-.44 in. *subpilosa*, Lec.

cc. Disk of prothorax flattened behind and prolonged into two dorso-lateral tubercles. Colour variable, blackish to testaceous, legs variable, but apparently with the base of the femora at least always rufous. .24-

.36 in. *proteus*, Kirby.

While definite information is lacking, it is probable that *A. proteus* and *A. pratensis* breed in pine, since they are so frequently found on piles of pine lumber. *A. bivittata* (Fig. 27) is to be collected on flowers of *Anemone pennsylvanica*. Mr. Leng calls the punctuation "sparse," but it is rather close and coarse.

GAUROTES, Lec.

G. cyanipennis, Say, is readily known by its brilliant colour. The body is black, shining often with a purplish tinge, the elytra bright green, polished, the antennæ, legs and mouth-parts yellowish. The head is distinctly but sparsely punctured, the prothorax almost smooth except at sides, the elytral punctuation very distinct but widely separated. Length, .36-.40 in. In Wisconsin I found this insect almost confined to Sumac blossoms. It is said to have been found ovipositing on butternut,



FIG. 27.

ENCYCLOPS, Newm.

E. cæruleus, Say, belongs here. It is smaller than most of the Lepturoides, and of slender parallel form, the elytra scarcely tapering to tip. The head is broad, squarish, the constriction far behind the eyes. Lateral thoracic tubercle distinct. Colour usually blue, varying to greenish, legs testaceous, antennæ with the bases of the joints (especially the distal ones) more or less testaceous. Punctuation strong, rugose. .28-.32. inch.

FOOD PLANTS OF THE SAN JOSE SCALE (*ASPIDIOTUS PER-
NICIOSUS*) IN OHIO, EXCLUSIVE OF FRUIT TREES.

BY F. M. WEBSTER, WOOSTER, OHIO.

The following list includes forest and ornamental trees and shrubs, upon which the San José scale has been found breeding in Ohio*. Nearly all of these have been found either by myself or my assistant, Mr. C. W. Mally, in sufficient numbers to indicate that the insect might thrive on any of them. The Cotoneaster was sent for inspection, it having been recently received from a Long Island nursery firm, and when received was literally covered with the scale :

| | |
|---|---|
| Grape, <i>Vitis labrusca</i> . | Willow (imported), <i>Salix viminalis</i> . |
| Linden, <i>Tilia Americana</i> . | Cut-leaved Birch, <i>Betula</i> , sp. |
| European Linden, <i>Tilia Europæa</i> . | Lombardy Poplar, <i>Populus dilatata</i> . |
| Sumac, <i>Rhus glabra</i> . | Carolina Poplar, <i>P. monilifera</i> . |
| Japan Quince, <i>Pyrus japonica</i> . | Golden-leaf Poplar, <i>P. Van Geerti</i> . |
| Cotoneaster, <i>C. frigidum</i> . | Catalpa, <i>C. speciosa</i> . |
| Flowering Peach, <i>Prunus</i> , sp. | Chestnut, <i>Castanea sativa</i> . |
| Flowering Cherry, <i>Prunus</i> , sp. | Osage Orange, <i>Maclura aurantiaca</i> . |
| American Elm, <i>Ulmus Americana</i> . | Snowball, <i>Viburnum opulus</i> . |
| Black Walnut, <i>Juglans nigra</i> . | |

To these must be added the several varieties of roses, currants, gooseberries and raspberries. The Early Richmond cherry I believe to be exempt from attack, as I have found trees whose branches interlocked with those of a pear that had been killed by the scale, yet the cherry was uninfested ; and in two cases that came under my observation, where this variety of cherry had been grafted upon mahaleb stock, and shoots had sprung up from below the graft, the shoots were badly infested with scale, while none at all could be found on the trees themselves.

* The determinations have been kindly verified by Dr. L. O. Howard, of the Division of Entomology, Department of Agriculture, Washington, and his assistants,

THE HIND WINGS OF THE DAY BUTTERFLIES.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

I wish to offer here a few remarks on the structure of the hind wings of the diurnals especially, in extension of my recent paper on the Butterflies of Hildesheim.*

The first point relates to the fact that the hind wings are more specialized as compared with the primaries. The probable explanation I offer is, that the hind wings bear more of the weight of the body (abdomen), and that they regulate the downward stroke of the fore wings. A parallel suggests itself with the vertebrates in which the hind legs are more specialized; and the cause is then, in both cases, a mechanical one. This specialization in the hind wings of the day butterflies manifests itself primarily in the inequality of the wings, of which the secondaries have the Radius 1 branched, the primaries 3 to 5 branched. In the second place by an advance over the front wings in the process of the absorption of the median veins, so that the radius or cubitus of the secondaries draws the branches nearer to itself than the corresponding vein of the primaries. Vein IV₁, in the case where its condition is not permanently generalized (*Lycaenidæ*, *Riodinidæ*, *Hesperiidæ*), is thus usually more drawn out of its original central position on the secondaries; it submits also first to degeneration (*Hesperiidæ*) on the hind wings, showing that here the cross vein has degenerated for a longer period than in the primaries, isolating the vein and depriving it of nourishment over a longer ancestral line. The cross vein itself vanishes first on the secondaries. Here the cell may be open, all trace of the scar vanished (*Araschina*, *Melitæa*), while on the fore wings the degenerate vein is present, closing the cell.

The progress in the evolution of the neururation is evidently taking place in identical directions on both wings. The generalized condition of the radius (it being 5-veined) of the primaries in *Papilio* gives way to a specialized condition (4-veined) in *Parnassius*, with an intermediate 5-veined state in *Thais*, in which latter the upper branch of the median series, vein IV₁, which has left the cross vein to emerge from the radius in *Parnassius*, leaves the cross vein near the upper angle of the cell.

The absorption of the veins is everywhere attended by the same indications of a physiological process which, in its external manifestations, it is easy to trace. It is the same with veins II. and III. of the hind

*Mittheilungen a. d. Roemer Museum, No. 8, Feb., 1897.

wings. The greater the extent of absorption of II. by III. (the radius), from the base of the secondaries outwardly, the more specialized is the form. In the *Limenitini* (*Nymphalinae*) the absorption is carried forward to the point of issue of the rudiment of I., so that the subfamily *Nymphalinae* may apparently be separated from the *Argynnis* by this character. While I have in various places in my paper correctly stated the change in the position of II. and III., owing to this basal fusion of the two veins, I have in others written of a withdrawal of I. towards the point of junction of II. and III., which, in fact, is the reverse of what takes place, although the effect seems the same. I. probably remains constant, or nearly so; in the cases where it is reduced to a mere scar it seems still to occupy the same relative position on vein II. It is extinguished by absorption. At the same time the fusion of II. and III. constantly changes in extent. In low forms, such as *Leptidia*, the two veins seem wholly separate at the base of the wing. In *Argynnis*, which is the lowest Nymphalid I have examined, the fusion at base is very limited, whereas in the highest Nymphalids the fusion is carried up to the point of issuance of I. In the Pierids the fusion is generally limited, and here, as I have pointed out in my essay, they lag behind the Nymphalids. The extent of the absorption is everywhere the measure of the specialization.

The last point to which I would here draw attention is the junction of the cross vein on hind wings with IV_3 , or rather V_1 . Here the Pierids have again lagged behind, the cross vein reaching IV_3 , although the portion of the base of IV_3 , between the junction of the cross vein and V_1 , must be held to belong to the cross vein. In the *Pararginae* and *Nymphalidae* the cross vein is withdrawn to the point of issuance of V_1 . The lower Meadow Browns agree with the *Limnadiidae* and *Pieridae* in the position of the cross vein of secondaries. In the *Riodinidae* (I have only examined the type) the cross vein is specialized as in the Nymphalids, while it is slightly removed outwards in the *Theclinae* and *Lycaninae*. Where the cross vein fails to meet the point of issuance of vein V_1 , lying outside of it, we must describe IV_3 as issuing from the cross vein, to which the base of IV_3 morphologically belongs.

A study of both fore and hind wings shows that on both the same processes are repeated, but the initial impetus for the changes seems to be always given by the hind wings. It is as if a wave passed over the wings, coming from the hind pair and breaking over the primaries, carrying these frail creatures further along their airy paths into their unknown future.

FURTHER NOTES ON SECTIONS OF AUGOCHLORA.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Since my note on the Mexican bees of the genus *Augochlora* was published I have been informed by Prof. Cockerell that he would not reply in this journal, but probably elsewhere. This conclusion seems to me to be remarkable, but I shall take this occasion to say what more I have to say on the subject and then leave it.

When I suggested two sections of *Augochlora*, in Trans. Am. Ent. Soc. XX., 147, I did not base my conclusion on the hind spurs alone, but because the two sets of species also agreed in other characters. I was too well acquainted with the characters of *Halictus* to suppose that a valid section of *Augochlora* could be maintained unless the spurs of a certain form were associated with other characters which indicated affinity. For example, *Halictus coriaceus* and *H. Forbesii* form a natural group of the genus and have finely serrate hind spurs. If I remember correctly *H. fuscipennis* belongs to the same group, but *H. parallelus*, which also has finely serrate spurs, does not. The sections of *Augochlora*, as I formed an idea of them at the time I mentioned them, might be defined as follows:

1. Slender species, having the sides of truncation of metathorax rounded above; hind spur of ♀ finely serrate; ventral segments of ♂ not metallic, or more or less metallic medially.

2. More robust species, having sides of truncation sharp; hind spurs of ♀ with 4-5 long teeth; basal ventral segments of ♂ metallic.

These characters belong to the species I indicated as coming in these sections, but it does not necessarily follow that other species with the same spur forms belong to either of them. Thus *A. splendida*, with basal fasciæ on second and third abdominal segments, may not belong to my second section.

That Prof. Cockerell did not know that the peculiar spur forms were secondary sexual characters of the females is shown by his failure to indicate the fact in the table; by his insisting that *A. viridula* and *A. fervida* could not belong to the second group on account of their spurs; by the use of the terms "ciliate or simple," which I think were taken from the males; and by his comparison of types through Col. Bingham. Smith's male types were referred to the first group without regard to any except their spur characters, which were of no value. If the types of *A. aspasia*, *A. aurora* and *A. splendida* had been males these species would have been referred to the first so-called subgenus; in other words, the author could not tell to which one of his own subgenera an *Augochlora* belonged. He failed to indicate valid characters of any natural group of *Augochlora*, and, in fact, showed that he had no idea of them.

SUCCESSFUL COLLECTING AT ELECTRIC LIGHT.

BY J. ALSTON MOFFAT, LONDON, ONT.

I herewith give a full list of the Lepidoptera new to the Society's collection, taken by Mr. J. W. Bice at electric light during the season of 1896.

Mr. Anderson and I picked out from amongst Mr. Bice's captures of about 2,000 mounted specimens of good material what seemed to be new to us; and after comparison with named specimens, or illustrations, having failed to recognize them, they were laid aside for others more competent than we to decide upon them.

I am greatly indebted to Dr. J. B. Smith for the patient endurance, amidst his multitude of professional duties, with which he attended to and promptly returned a number of small lots sent to him by mail—the unreasonable demands of the U. S. customs officer at the boundary line prohibiting their being sent in bulk by express, and thus increasing the labour connected with it. And not only for the names of the specimens, but also for interesting and instructive remarks upon many of the species; Dr. Hulst also assisting me with the Geometers. Most of those new to the collection were in single specimens of their kind, and Mr. Bice has generously donated them to the Society.

The names and their sequence are in accordance with Dr. Smith's list of 1891.

Protoparce carolina, Linn.

Cisthene unifascia, G. & R.

Lithosia bicolor, Grote.

Parorgyia parallela, G. & R.

Oedemasia badia, Pack.

Acronycta dactylina, Grote.

Acronycta impressa, Walk.

Cerma cora, Hub. Upon this species, Dr. Smith remarks: "Distinctly rare."

Semiophora tenebrifera, Walk.

Agrotis catherina, Grote.

Pachnobia salicarum, Walk.

Dicopis muralis, Grote.

Dicopis Thaxterianus, Grote. Dr. Smith says: "Very good indeed, not in my collection."

Eutolype bombyciformis, Smith.

Eutolype Rolandi, Grote.

Mamestra assimilis, Morr.

Hadena passer, Guen.

Hadena indirecta, Grote. Dr. Smith remarks: "Quite a new locality for this species. I have it from British Columbia and the Rocky Mountain region, but have never had it from anywhere near you."

Hadena diversicolor, Morr.

Taeniocampa vegeta, Morr.

Homoglaea hircina, Morr.

Cucullia florea, Guen.

Heliothis (Chloridea) rhexia, S. & A.

Galgula hepara, Grote. I took my first specimen of this insect in July, 1896, and sent it to Prof. Fernald, under the impression that it was a Tortricid, who kindly named it for me; Mr. Bice's specimen was so dissimilar that I did not recognize it.

Homoptera Woodii, Grote.

Palthis asopialis, Guen.

Brotis vulneraria, Hub.

Semiothisa dislocaria, Pack.

Boarmia pampinaria, Guen.

Eubyia cupidaria, Grote.

Besides those altogether new, there were many interesting and unexpected varieties of common things brought to view by Mr. Bice's collection; which when disclosed were quite surprising to one not familiar with the extent and direction variation may go in some species, emphasizing with special force what Dr. Skinner gives in the subjoined extract as his experience with the butterflies:

"When I commenced my collection I was satisfied to have a single pair to represent the species, but now I cannot get enough individuals to represent all manner and kinds of variation brought about by natural causes. In the past I, therefore, knew this species or that, but now in many of our genera I nearly get brain fever in trying to determine where a species begins or ends."

BOOK NOTICES.

THE PARASITIC DISEASES OF POULTRY; by Fred V. Theobald, A. M., F. E. S.; 12 mo., pp. 120. Gurney & Jackson: 1 Paternoster Row, London, 1896.

It is encouraging to see a growing interest in applied entomology in England, and Mr. Theobald has given, in this handy little volume, a popular account of not only insect parasites but all other parasitic troubles likely to confront the poultry breeder. Not only is the little manual especially fitted for the wants of such, but it will doubtless find its way to the library of many other gentlemen who rely upon their estates to furnish fowls for their tables. The book is divided into several parts, relating to protozoan parasites, insect parasites, mite parasites, worm parasites, and vegetable parasites. Besides containing twenty-three illustrations, appendix I. gives a list of the parasites of *Gallus domesticus*, with the part of the fowl attacked by them; appendix II. a quite full bibliography of the literature of the subject, which, with a very complete index, renders the volume of scientific as well as practical value, and Americans will find it of interest to them as well as Englishmen. We wish Mr. Theobald success in his efforts to add to the practical entomological literature of his people.

F. M. W.

ÜBER DIE PALPEN DER RHOPALOCEREN. Ein Beitrag zur Erkenntnis der Verwandtschaftlichen Beziehungen unter den Tagfaltern; mit 6 Tafeln: von Dr. Enzo Reuter. Acta Societatis Scientiarum Fennicæ. Tom. XXII., No. 1. Helsingfors, 1896.

Entomologists in general, and lepidopterists in particular, will be interested in this work of Dr. Reuter's, occupying as it does a folio volume of 577 pages, the investigations, upon which the facts are chiefly based, requiring the examination of 3,557 palpi, belonging to 670 species, contained in 302 genera of the Rhopalocera. The work is divided into two parts: the first dealing with the direct microscopical examinations in descriptive form, while in the second is given the conclusions based on the same, as well as a discussion of other taxonomic characters allied to those brought out by himself, and their values. The plates are very fine, and the sixth of especial interest generally, as it presents, in the form of an evolutionary tree, the relations of the various groups and genera to each other.

Dr. Reuter calls attention to the fact that at the base of the basal joint on the inner side of the palpi of butterflies is found a clearly distinguishable, naked spot, which he proposes to term the basal spot, on the surface of which are fine grooves and ridges as well as sparsely placed foveæ, and great numbers of peculiar, subconical, hairy rugosities. These last, though occurring normally in the Diurnals, and especially in the Nymphalidæ, and being clearly distinguishable with a low power lens, have formerly remained unknown, or if known have not been mentioned in entomological literature.

These ridges were by Landois considered as stridulating organs, and the two last structures in analogy with those observed by Kræplin, Forel, Hauser, and others, on the antennæ of various insects and looked upon as being sense organs; but whether the peculiar structures in question served to convey the sense of smell, or, perhaps, some other and nearly related sense, is still an open question.

The Rhopalocera especially, of all the lepidoptera, have a special interest, because in them these cones present the greatest variations in form and are here the most highly developed.

Through further research, Dr. Reuter was convinced that a thorough study of the palpi, and especially of the basal spot, would afford a not inconsiderable basis for a knowledge of the family affinities of the individual genera and groups contained in the Rhopalocera, and he therefore determined to direct his especial attention to them, extending his studies over all of the families, and where possible over the smaller groups, as also to study the material at his disposal from a direct and thoroughly morphological point of view.

F. M. W.

OVIPOSITION OF DORYTOMUS SQUAMOSUS (Lec.).

This is a very common beetle upon cottonwoods in Colorado, but I have never known anything of its injuries until recently, when I had the good fortune to come upon a female preparing a burrow for her eggs in a terminal flower bud. When first observed she had her beak in the side of the bud up to her eyes. The twig was broken from the tree and carried in the hand without in the least disturbing the work of the beetle. After about ten minutes she removed her beak, turned quickly about and applied the tip of her abdomen to the hole she had made. After remaining in this position for about two minutes she ejected a small amount of a dark brown, thick liquid, which completely covered and hid the opening in the bud. This done she walked away.

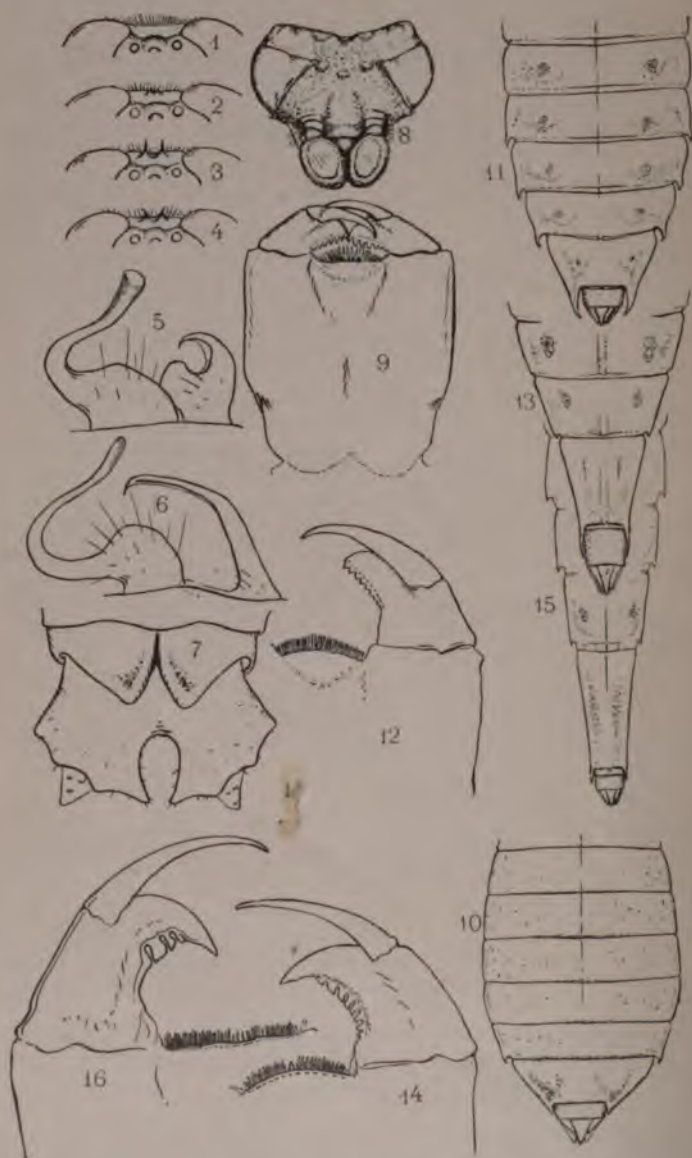
The bud contained the catkin of a staminate flower which was nearly ready to burst forth, and immediately beneath the puncture in the bud scales, on the axis of inflorescence, were found three eggs lying close together.

The eggs were light yellow in colour, with a very thin, flexible shell, and although somewhat irregular in shape, measured about .85 mm. in length by .5 mm. in breadth.

C. P. GILLETTE.

Mailed July 8th, 1897.





NORTH AMERICAN GOMPHINAE.

The Canadian Entomologist.

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No. 8.

PRELIMINARY STUDIES OF N. AMERICAN GOMPHINÆ.

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.*

(Continued from page 168.)

Herpetogomphus pictus, n. sp. Male.—Ithaca, N. Y.

Length, 49 mm.; abdomen, 35; hind wing, 27.

Green and brown, varied with black and yellow.

Face and frons above entirely yellow; a broad black band between the eyes, including the ocelli; antennæ black, the extreme rim of their cuplike insertions yellow. Occiput yellow, its border convex, ciliated with black. Rear of eyes brown, paler externally.

Prothorax fuscous, with a median twin spot greenish.

Thorax bright green, very thinly clad with brownish hairs, and faintly striped with brown. Dorsal and both lateral stripes subobsolete. Humeral stripe complete, irregular; antehumeral, isolated above, and separated from the humeral by a narrow green line. Subalar and antealar carinæ brown.

Wings hyaline, flavescens at the base. Membranule minute, pale; stigma brown; veins black; costa faintly yellow externally.

Femora straw yellow, lined with black internally and each with a subapical incomplete ring of black. Tibiæ black, each with an external straw yellow line. Tarsi black; hind tarsi with a yellowish mark on the second and third segments superiorly.

Abdomen brown with transverse apical rings of black on segments 2 to 9; additional transverse lines of black on segments 3 to 7 at one-third the length of the segments. A middorsal yellow line, diffuse on segments 3 to 6, sharply bordered with black on 7 to 9. Apex of segment 10 and sides of 8 and 9 (except extreme lateral margin, which is black) and appendages yellow.

Superior appendages scarcely longer than the 10th segment, clad with blackish hairs. Seen from above they are divergent half their length, then parallel to their blunt

*An unfortunate misarrangement of the table for nymphs crept in at the end of the last paper. The two paragraphs immediately preceding the last one on page 168 both relate to *Stylurus*. They should therefore be consolidated and preceded by 7.

Prof. T. D. A. Cockerell has promptly and very kindly called my attention to an oversight in proposing the name *Orcus*, which is pre-occupied. I replace it with *Arigomphus*.

tips. Seen from the side they are thickest at the base and are gradually thinned and slightly declined to their truncate tips, beneath which are three or four rows of minute black denticles, extending more than half way to the base. Inferior appendage bifid for nearly half its length, the branches slightly divergent, truncate a little obliquely on tip, bent up at an angle with the declined basal portion, and bearing on each superolateral margin a broad quadrangular elevation just before the obtuse apex.

The appendages of the 2nd segment are very similar to those of *O. carolus*. (See plate.)

Two ♂s from Ithaca in the Cornell University collection. One ♂ collected by Mr. J. O. Martin, at Ithaca, June 7th, 1897. A handsome species.

The occurrence of a *Herpetogomphus* at Ithaca was quite unexpected. All other species of the genus are from the extreme west and southwest. This one is related to *H. elaps*, Selys, of Mexico.

Ophiogomphus johannus, n sp. Male. —Wilmurt, N. Y.

Length, 43 mm.; abdomen, 30; hind wing, 26.

Black and yellow.

Labrum pale with a narrow brown margin which is broadened laterally. Face yellow; rear of frons and vertex except the rear black. Occiput yellow, its margin ciliated with black.

Thorax yellow, with thin brownish hairs; a narrow middorsal fuscous stripe subobsolete anteriorly, forking above with the carina to unite on either side with the fused humeral and antehumeral stripes, which are separated by a narrow yellow line only in their middle portion. Sides yellow, with an incomplete fuscous stripe on the 1st and a complete narrow one on the 2nd lateral sutures, and with fuscous markings above the bases of the legs.

Wings hyaline (immature).

Legs fuscous; front femora paler below.

Abdomen black, marked with yellow as follows: Sides of segments 1 and 2, except behind auricles; two lateral spots on 2 to 7; sides of 8 and 9, except the inferior margin; apical half of 10; a maculose middorsal line reduced to very narrow basal spots on 5 to 8, wanting on 9.

Superior appendages slightly longer than 10, yellowish, darker at the tip, cylindric, moderately divaricate and equally narrowed in their apical fourth to an acute tip. Seen from the side they are a little angulated near the base and beyond this point irregularly denticulate beneath to a point just before the tip, where they are suddenly contracted from below upward, leaving the point at the upper side.

Inferior appendage bifid almost to its base, its branches straight, cylindric, about as long as superiors and twice as stout, almost as divergent, each apparently forked by reason of a very large external upturned tooth at two-fifths of its length; at the extreme apex another stout upturned tooth. (For genital hamules see plate.)

A single ♂, with its cast skin, from Wilmurt, N. Y., in the Cornell University collection.

Ophiogomphus carolinus, n. sp. Male and female.—Ithaca, N. Y.

Length, 40-42 mm.; abdomen, 28-31; hind wing, 24-26

Greenish-yellow and blackish-brown.

Face greenish-yellow, paler toward the mouth. Rear of frons and vertex except the rear, black. Occiput yellow, its slightly convex margin ciliated with long black hairs. In the female there is generally in front of the margin a pair of black-tipped spines, whose various development is shown in plate, figs. 1 to 4. These sometimes occupy the margin which then becomes notched between them. Rear of eyes black above, mottled with paler below.

Prothorax blackish, its hind lobe with a median twin spot and a lateral spot each side yellow.

Thorax greenish, its dorsal stripes fused, enveloping the carina and forking with it above to meet the humeral. Antehumeral stripe isolated above, sometimes meeting the humeral near its upper end, but well separated through most of its length by a narrow greenish line. A partial brown line on the 1st lateral suture and a narrow complete one on the 2nd.

Legs black, front femora paler below.

Wings hyaline, often flavescent at base, costa black; stigma cinereous.

Abdomen cylindric, a little narrower in its middle two-thirds, superiorly blackish with a maculose yellowish middorsal line of lanceolate spots on segments 3 to 7, of quadrangular basal spots on 8 and 9. Inferiorly, whitish with fuscous apical spots on most of the segments. Ten yellow; fuscous at both ends.

Male appendages: superiors, longer than the 10th segment, cylindric; seen from above, with acute apices divergent; seen from side, fusiform, with truncate apices, denticulate beneath for one-third their length. Inferior appendage (see plate, fig. 7) bifid by a rounded notch, each branch somewhat flattened with four distal angles (as shown in the figure) or sometimes with only two (merely obliquely truncate); always with an upturned tooth at the outermost angle, sometimes with another at the innermost.

The genital hamules are shown at fig. 6 in the plate. These appear to be quite constant in form.

Female appendages fuscous, longer than 10; anal segment as long as the 10th. Vulvar lamina about as long as the 9th segment; bifid except basal fourth, the branches enclosing an oval notch beyond which their incurved apices meet and then abruptly separate in short, oval, divergent points.

Described from more than seventy bred specimens (some of which will find their way into the collections of all my correspondents), from a single ♀ in the Cornell University collection, and from five specimens captured in May by Mr. Chester Young and Mr. J. O. Martin. I collected nymphs in October which emerged on my table in March. It was easy to collect the nymphs by hundreds in April, and in May the banks of the waters they frequented were fairly covered with exuviae. Yet, outside of my breeding cages I saw but one live imago, notwith-

standing I was doing much collecting at all times and in all places considered favourable. Where were they?

I have recently bred *A. villosipes*, Selys, by scores, and I find its exuviae sticking to every bank about Ithaca, yet I have not seen a single imago at large. The imagoes, where are they?

Arigomphus australis, n. sp. Male.—Gotha, Fla.

Length, 52 mm.; abdomen, 39; hind wing, 27.

Black and olive.

Face yellow with dense black pubescence.

A black stripe across base of labrum and another across the anterior margin of the frons. Rear of frons and whole of vertex black. Occiput yellow, convex, ciliate with black. Rear of eyes black above, yellow below.

Prothorax black with a median twin spot and a larger spot each side yellow.

Thorax olivaceous, striped with brown as follows: Dorsal stripes fused to form a cuneiform dorsal spot, not reaching the base, and narrowly divided with yellow along the extreme summit of the carina. Its narrow upper end is met by the strongly incurved antehumeral stripes, which are well separated from the narrower humeral stripes. Narrow but distinct stripes on both lateral sutures.

Legs black. Front femora pale within.

Wings hyaline, costa yellow, stigma brown. Veins black. Hind wing chalky near anal margin.

Abdomen long, slender. Segments 3 to 6 cylindric, narrower than terminal segments, entirely black. Remaining segments black, marked with yellow as follows: Sides of 1 and 2; dorsal lanceolate spots on 7 and 8; sides of 7 apically, and sides of 8 to 10 entirely yellow, 8 one-half longer than 9. Superior appendages about equalling 10, pale brown, divaricate at a right angle. Seen from above the inner margin is straight, the outer margin ends in a stout tooth, beyond which it is cut to a long acute point. Seen from the side each is gradually narrowed to a pointed apex, with a large acute tooth directly under the basal fourth, not visible at all from above. Inferior appendage with branches more divaricate, shorter, very little upcurved, ending under the apex of the lateral tooth.

One finely coloured ♂ taken by Mr. Adolph Hempel, in Orange Co., Fla., on the 21st of April, 1897.

At the same time Mr. Hempel took a *Progomphus obscurus*, Ramb., with its skin, in transformation. While the nymph was known by fair supposition, it appears not to have been reared before.

Mr. Hempel sent me also a nymph of the extraordinary type referred by Hagen (Trans. Amer. Ent. Soc., XII., 277, 1885) to *Aphylla producta*, Selys. It is time for someone to find the imago in Florida.

Gomphus umbratus, n. sp. Male and female.—Ithaca, N. Y.

Length, 50-54 mm.; abdomen, 35-39; hind wing, 30-32.

Brown and olive, variable.

Face yellow, washed with brown in indistinct lines across the base of the labium and close under the frontal prominence. Rear of frons above and whole of vertex brown. Antennae black. Occiput yellow, its hind margin convex (male and female), ciliated with black.

Prothorax variable, but always showing a median twin spot of yellow.

Thorax brown with a pair of nearly parallel dorsal stripes of yellowish-green, each sending at its lower end a spur against the carina, and at its upper end another spur around the isolated upper end of the antehumeral stripe of brown. Humeral and antehumeral stripes of brown fused at lower end and near the upper end, and sometimes all the way between. Brown stripes of the lateral sutures overspreading the area between them, or sometimes the sides of the thorax wholly brown.

Femora brown, with numerous long spines in females. Tibiae black, with a yellowish external line on each. Tarsi black.

Wings hyaline; their basal articulation and stigma rich brown when fully coloured. Costa yellow externally, veins black.

Abdomen cylindric in the female, slightly narrowed between the ends in the male, fuscous; basal fourth of middle segments paler and including a yellowish spot inferiorly. Middorsal stripe of yellow continuous at the base, reduced to lanceolate spots on segments 4 to 8, on 8 very short, on 9 wanting, 10 with a yellow spot in the female, uniform olive-brown in the male.

Male superior appendages flattened, a little arched. Seen from above the inner margin is nearly straight; at two-thirds their length they are cut obliquely to form a long point with an obtuse angle on the external margin. Seen from the side a low obtuse lobe appears on the interno-inferior carina just beyond the external angle. Inferior appendages a little shorter, more divergent and strongly upcurved at apices.

Female vulvar lamina transverse, one-third as long as wide, notched in the middle.

Described from seventeen specimens (14 males and three females), several of them bred, all obtained at Ithaca, N. Y., in May. A common species; next to *G. descriptus*, Banks, perhaps the commonest of the season; more variable in coloration than any other Gomphine I have seen.

Stylurus segregans, n. sp. Male—Havana, Ill.

Length, 61 mm.; abdomen, 44; hind wing, 35.

Face yellowish. Frons yellow, infuscated superiorly. A narrow fuscous stripe in front of ocelli. Frons and the ridge-like elevations behind each lateral ocellus pilose with soft black hairs. Occiput yellow, its border straight, ciliated with stiff black hairs.

Thorax fuscous; dorsum with two isolated lateral yellow stripes, divergent anteriorly. A narrow antehumeral line and a broad stripe down the middle of each of the lateral sclerites, yellow.

Legs brownish, paler internally, with black spinules. Claws pale, with apex and inferior tooth black.

Wings hyaline.

Abdomen fuscous, marked with yellow as follows: Dorsum of segment 1, a line on 2, basal middorsal spots on 3 to 8, extreme apex of 8, sides of 1 and 2, basal lateral spot on 3 to 7, sides of 7 and 8 except extreme lateral margin and apex, and all of 10.

Male superior appendages yellowish-brown, much longer than 10, divaricate at almost a right angle, slightly incurved toward the tip and cut obliquely to form an obtuse external angle at two-thirds their length, and a supero-internal point. The bevelled portion is minutely denticulate opposite the apices of the inferior appendage. No teeth or spines. The inferior appendage is bifid half its length with branches strongly divergent and strongly upcurved, their apices resting outside the bevelled portion of the superiors. Posterior genital hamule simple; pointed, directed forward at an angle of 45 degrees with the axis of the abdomen.

Name refers to its extremely local occurrence.

The single imago was obtained by Mr. C. A. Hart and myself, by rearing a nymph which we found crawling from the water upon bur-rush leaves, 23rd June, 1896, in the mouth of Quiver Creek. I obtained several exuviae there, and several others later at McHairy's mill-dam some miles further up.

The nymphs of this and of the preceding species will be described in a forthcoming bulletin of the Illinois State Laboratory of Natural History.

Since this paper was written, I have obtained at Ithaca, N. Y., nymphs which can be none other than *Dromogomphus spinosus*, Selys. They fall in the same section of the table with *Arigomphus*, *Stylurus* and *Gomphus*, from all which they are distinguished by a sharp middorsal longitudinal ridge, ending in a straight apical spine on the 9th abdominal segment.

EXPLANATION OF PLATE 7.

Figs. 1, 2, 3 and 4.—The occiput of the female of *Ophiogomphus carolus*, seen from the front, showing variations in occipital spines.

Fig. 5.—Genital hamules of *Ophiogomphus johannus* from the left side, inverted.

Fig. 6.—Do. of *Ophiogomphus carolus*.

Fig. 7.—Inferior abdominal appendage of *O. carolus* seen from below.

Fig. 8.—Head of nymph of *Lanthus parvulus*, seen from above and in front.

Fig. 9.—Mentum of labium of do. from above.

Fig. 10.—End of abdomen of do.

Fig. 11.—End of abdomen of *Gomphus fraternus*, nymph.

Fig. 12.—Part of labium of do.

Fig. 13.—End of abdomen of *Arigomphus pallidus*, nymph.

Fig. 14.—Part of labium of do.

Fig. 15.—End of abdomen of *Stylurus segregans*, nymph.

Fig. 16.—Part of labium of do.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXVI. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(*Continued.*)

* BELLAMIRA, Lec.

With this genus begins a series of beetles in which the neck is longer than in *Encyclops*, owing to the constriction of the head being near the eyes. *B. scalaris*, Say, is a very fine insect, varying in length from .75 to 1.20 inch. The form is slender, the elytra tapering greatly to and rounded at tip, deeply sinuate at sides, the tip of the abdomen uncovered. The prothorax is bell-shaped, with prominent, rather flattened hind angles. Colour brownish; most of the head, the greater portion of the fore and middle legs, the bases of the hind femora and the bases and tips of the ventral segments inclining to reddish or even yellowish. Antennæ rufous. Elytra brownish, with a large common, lighter (golden-sericeous), wedge-shaped mark (wavy on the edges and sometimes interrupted at about one-third its length by a transverse brownish band) which extends about two-thirds to tip. The body is finely and densely, in most places rugosely, punctured, clothed with fine golden pubescence, which is much denser on certain parts, notably the abdomen. Recorded as breeding in birch, and has been seen ovipositing in maple stumps.

STRANGALIA, Serv.

Includes two extremely elongate slender species, having the general form of *Bellamira*, but much smaller. *S. bicolor*, Swed., is entirely rufous except the eyes, the tips of the mandibles, the incisures of some of the tarsal joints and the elytra, which are black. Length .48-.56 inch. *S. luteicornis*, Fabr., is rufo-testaceous or yellowish; the eyes, some markings on the under side, a ring at the tip of the hind femora, two dorso-lateral stripes on the prothorax, a narrow basal and three other transverse bands on the elytra, black. Length .36-.52 inch.

TYPOCERUS, Lec.

The impressed poriferous spaces on the antennæ, which separate this genus from *Leptura*, are to be looked for near the bases of the sixth and following joints, appearing as elliptical smoother spots. A good plan is to take the common *T. velutinus* as a type for examination, since in this species they are very distinct, and having once seen them their detection is easy in the remaining species. The four Canadian

forms may be separated by their colour, but it is to be remembered that the elytral pattern is subject to variation. None of them have the prothorax strongly rounded on the sides, but the form of this segment is campanulate. Excluding the extra-limital forms, those belonging to our fauna may be thus known :

- A. Body above and beneath, legs and antennæ entirely black, except occasionally a rufescent spot in humeral region. .36-.44 in. *lugubris*, Say.
- AA. Body beneath variable, antennæ blackish, legs black or rufous, elytra never entirely black, usually banded.
 - b. Legs black. Elytra black with three transverse bands and basal spot yellow, the anterior two bands sometimes united at suture. .36-.40 in. *sparsus*, Lec.
 - bb. Legs ferruginous.
 - Prothorax very coarsely sparsely punctured. Elytra black, with basal spot and three transverse bands (the anterior two frequently united at suture) yellow. .40-.52 inch. *zebratus*, Fabr.
 - Prothorax more finely and densely punctured. Elytra brownish or reddish, with yellow markings much like those of the preceding species, but these may be incomplete or even wanting. .40-.56 inch. *velutinus*, Oliv.

T. zebratus (fig. 28) is said to mine in white oak. It bears considerable resemblance to *Leptura nitens*, from which it, however, easily separates by the generic character. *T. sparsus* is unknown to me, and the description is taken from Mr. Leng's table; *velutinus* is often very abundant on flowers in the summer months.

LEPTURA, Serv.

This genus is of very large size, and many of the species are quite abundant. There is no uniformity of facies to give a ready clue to its separation from allied groups, some of the species resembling *Strangalia* in the shape of the prothorax, while others are very different.

The succeeding synopsis follows those of Dr. Leconte and Mr. Chas. W. Leng, with but few changes, chiefly such as are made necessary by later corrections of synonymy.



FIG. 28.

- Prothorax more or less triangular, or campanulate, widest at base... 2.
- Prothorax nearly quadrate, or else more or less rounded or subcampanulate, usually constricted in front and behind, hind angles not prolonged 23.
2. Hind angles of prothorax prolonged 3.
- Hind angles not prolonged 16.
3. Very large species (1.20 in.), prothorax strongly narrowed from the base, which is broadly but deeply bisinuate, posterior transverse impression distinct. Elytra widest at base, gradually narrowed behind, truncate and emarginate at tip, which is not margined. Black with velvety pubescence, elytra red, apex black, antennæ feebly serrate, elytra not sulcate *emarginata*, Fabr.
- Small or moderate sized species 4.
4. Prothorax without distinct transverse basal impression. Small species, elytra sub-parallel at sides, not spotted nor banded, but uniformly dark. Prothorax often red, hind angles usually small. 10.
- Prothorax with transverse basal impression often deep. Moderate sized species, elytra usually narrowed behind, often very much so, and frequently spotted, striped or banded 5.
5. Prothorax convex, with the sides much rounded in front of the middle, a transverse depression at base, hind angles small. Elytra black and yellow 14.
- Prothorax with sides not much rounded in front of the middle, ... 6.
6. Prothorax strongly narrowed from the base, usually regularly so. 7.
- Prothorax subcampanulate, transverse basal impression deep, hind angles broad, laminate, fourth joint of antennæ shorter than usual, elytra not banded nor spotted 15.
7. Elytra black or testaceous with black tip. Abdomen with the third, fourth and base of fifth ventrals red. Prothorax finely punctured. .48-.52 in. *plebeja*, Rand.
- Elytra with black and red or yellow markings 8.
8. Antennæ annulate 9.
- Antennæ not annulate. Black, elytra very dehiscent, and not narrowed behind, coarsely punctured, sides of elytra, metathorax and abdomen red, thighs red with black tips. .36 in. *cruentata*, Hald.
9. Female reddish-yellow, varied with black beneath, legs more or less black; above with top of head, a discal thoracic stripe or spot, scutellum, sutural and side margins and transverse sub-median elytral band, black. Male black, base of legs and discal elytral

- vitta (usually broken), as well as a small spot under the humerus, yellow. Antennæ annulate in both sexes. .48-.60 in. *subhamata*, Rand.
- Blackish, region of the mouth often yellowish. Legs and elytra testaceous or yellowish, the latter with sutural discal and lateral marginal vittæ black. .32-.52 in. *lincola*, Say.
10. Elytra margined and usually rounded at tip. 11.
Elytra not or scarcely margined at tip. Blackish, pubescence white, head, legs and first antennal joint sometimes reddish or partly so. .24-.30 in. *subargentata*, Kirby.
11. Black, elytra blue, polished coarsely and sparsely punctured, antennæ and legs either black or yellow. .24 in. *chalybea*, Hald.
Black or piceous, head and prothorax often reddish, legs and antennæ frequently in part yellow. 12.
12. Elytra shining, very coarsely punctured, tip subtruncate. Colour black, legs black, head and prothorax reddish. .26-.36 in. *capitata*, Newm.
Elytra more finely punctured, pubescence fine, white, prothorax and head rarely (never ?) at once red or yellow, though often separately so. 13.
13. Antennæ piceous; anterior femora and base of middle ones yellowish. Upper surface piceous or (in the var. *hamatites*, Newm.) the prothorax may be reddish. Terminal ventral segment of female simple. .16-.24 in. *nana*, Newm.
Antennæ piceous, basal joint yellow. Anterior femora and the bases of middle and hind ones yellow. Terminal segment of female with a slight tuberosity near apical margin. Colour piceous or blackish, thorax usually with yellow margin. .22-.28 in. *exigua*, Newm.
14. Black, antennæ brownish, legs and tips of abdominal segments ferruginous, pubescence golden, so dense as to conceal most of the surface colour except on the legs, antennæ, tips of abdominal segments, middle of prothorax, five elytral bands and the sutural margin. .40-.52 in. *nitens*, Forst.
Black, antennæ and tibiæ often reddish, pubescence cinereous, not concealing the colour. Elytra yellowish, base, tip and two intermediate (usually interrupted) bands black. .31-.38 in. *sexmaculata*, Linn.
15. Black, elytra sometimes rufous or testaceous, prothorax very densely coarsely punctured, elytral punctuation less dense. Antennæ not

- annulate, elytra sharply obliquely truncate at tip. .40-.60 in. *nigrella*, Say.
16. Antennæ annulated (except in ♂ of *canadensis*).....17.
Antennæ not annulated.....19.
17. Elytra parallel, elongate, truncate at tip, front of head with transverse impression. Colour black, punctuation fine and dense. Legs reddish or brownish. .40 in. *pedalis*, Lec.
Elytra narrowed from the base18.
18. Tips of elytra deeply truncato-emarginate, antennæ serrate in the ♂. Punctuation very coarse and close, sub-confluent. Black, elytra usually with large red basal spot, which may extend (in the var. *erythroptera*) over the entire surface. .48-.76 in. *canadensis*, Oliv.
Tips of elytra truncate or feebly emarginate, body of ordinary form, not very stout; punctuation of elytra finer, well separated. Black, elytra reddish, abdomen red ♂ or black ♀ *rubrica*, Say.
Tips of elytra nearly rounded, very dehiscent. Form very short and stout, head broad, elytra coarsely punctured. Black, elytra often with reddish or yellowish submarginal stripe or entirely testaceous. .36-.48 in. *vagans*, Oliv.
19. Body densely golden pubescent. Blackish, elytra testaceous, often darker at sides. .48-.56 in. *chrysocoma*, Kby.
Body only moderately or sparsely pubescent.....20.
20. Black, elytra reddish or testaceous, wholly or for the greater part. 21.
Black, elytra black, each with four yellowish spots, thighs pale at base. .40-.48 in. *octonotata*, Say.
21. Elytral margin very deeply sinuate (on viewing the insect from the side). Prothorax with a tolerably well-marked median channel, at bottom of which is an abbreviated raised line. Black, elytra reddish except at tip, which is rather broadly obliquely marked with a black blotch and truncate. .52-.75 in. *proxima*, Say.
Elytral margin not deeply sinuate.....22.
22. Larger, prothorax with very distinct median channel which is wider behind. Brownish red, elytra paler, with a submarginal dark spot near the middle, tip obliquely truncate. .48-.52 in. *biforis*, Newm.
Smaller, prothorax without median channel. Black, elytra reddish to testaceous, tip blackish, squarely truncate. .40-.48 in. *sanguinea*, Lec.
23. Prothorax hardly narrowed anteriorly and not constricted behind. Seventh and following antennal joints with a raised line beneath.

- Black, elytra sometimes (in var. *luridipennis*, Hald.) testaceous or with the tip alone dark. .32-.52 in *mutabilis*, Newm.
- Prothorax much, often suddenly, narrowed anteriorly, with or without distinct constrictions. 24.
24. Basal prothoracic constriction very deep, sides strongly rounded. .26.
Basal prothoracic constriction feeble or absent. 25.
25. Prothorax densely punctured, with median smooth line. Neck very close to eyes. Black, without markings. .36-.40 in. *pubera*, Say.
Prothorax sparsely punctured, head longer behind the eyes. Usually black, elytra with or without a narrow discal yellow vitta. Varies to entirely testaceous. .40-.52 in *vittata*, Oliv.
26. Black; legs more or less yellow; prothorax (in var. *ruficollis*, Say) sometimes red, nearly smooth, except at base. Antennæ with tendency to become reddish at tips of joints. .28-.32 in *spharicollis*, Say.
- Black, legs almost entirely yellow in most specimens, prothorax occasionally red, finely and sparsely punctured, except at base, where it becomes more pronounced. Antennæ with the tips of the joints more evidently reddish, elytra with side margin and long discal vitta yellow. .24-.40 in *vibex*, Newm.

Probably the only serious difficulty to confront beginners in the use of the above table will arise in making the choice between the first two divisions; *i. e.*, 2 and 23. Should doubt arise here the assumption may be made that it belongs in the latter, when reference to other thoracic characters or to those of colour will soon show if the student is on the wrong track. The measurements here, as elsewhere, are in the main those of Mr. Leng, though I have frequently extended them, as shown by specimens in my own collections.



FIG. 29.

With regard to food habits very little can be said, so few of the *Lepturae* having been bred; while the perfect insects are commonly found on flowers, these give little or no clue to the feeding habits of the larvæ. Mr. Harrington has taken *L. subhamata* (fig. 29) on oak and also in a beech log, while the pupa of *L. canadensis* has been found in a hemlock stump. *L. nitens* bores, as a larva, in black oak, *L. vagans* in the yellow birch and pignut hickory, *L. proxima* has been reared from maple.

It will probably be noted that the authorities cited for certain of the species are not the same as those in the Check List. The reasons for these changes will be found in Mr. Leng's paper on the genus. Both *L. nana* and *L. exigua* are included in the table, although I am not sure that the latter occurs within our limits; the former has been recorded by Dr. Hamilton (CAN. ENT., XXI, pp. 33 and 108). The name *zebra* is replaced by *nitens* on the ground of priority; *sphaericollis* has been preferred as the specific and *ruficollis* as the varietal name, following Mr. Leng. In all probability *L. lacustris*, Casey, described from Michigan, will be found in Ontario. It differs by description from *sanguinea* in the much stouter male antennae, and by the apices of the elytra being narrowly and obliquely truncate, the truncation sinuate, the angles, especially the exterior, very acute and prominent.

DESCRIPTIONS OF NEW SPIDERS.

BY NATHAN BANKS, WASHINGTON, D. C.

Teminius affinis, n. sp.

Length ♀ 13 mm.; ceph. 5 mm. long, 3.5 mm. wide; patella plus tibia IV. 6 mm. long. Cephalothorax red-brown, darkest around head; mandibles dark red-brown; legs and palpi yellow-brown, lighter at tips; sternum dark red-brown; abdomen nearly black above, with faint indications of a light median streak, in the base of which is a black spear-mark; venter dark gray; spinnerets yellow. Posterior row of eyes straight, broader than anterior row; P. M. E. round, separated by their diameter, nearer to each other than to the larger P. S. E.; A. M. E. about half their diameter apart, and slightly nearer to the A. S. E. than to each other. Legs quite long, no spines above or below on tibia I., and none above on tibia IV.; thick scopulas to all tarsi and metatarsi (except IV.). Sternum broad; the abdomen long and narrow; the upper spinnerets distinctly two-jointed and much longer than the lower pair, the second joint more than twice as long as wide. The epigynum shows a rounded cavity, slightly longer than broad, broader behind than in front, the anterior portion paler than the rest; there is a median septum which in the fore part is narrow, but quite suddenly broadens at the middle and then tapers to the broadly rounded tip.

One specimen, Brazos Co., Texas. It differs from *T. continentalis*, Keys, in the larger size, position of eyes, spines on legs, and shape of the epigynum.

Thargalia canadensis, n. sp.

Length ♀ 7 mm.; ceph. 2.8 mm. long, 2 mm. broad; patella plus tibia IV. 2.8 mm. Cephalothorax reddish yellow-brown, pars cephalica black; mandibles dark red-brown; anterior pairs of legs yellowish, hind pairs reddish, all femora with a black stripe each side, those on the fore pairs are much broader at base, the under side of tibia and metatarsus IV. infuscated; maxillæ dark brown, pale on margin; sternum reddish; coxæ yellowish; abdomen black above, paler below, reddish around the epigynum, above with a narrow white band near base, and another just before the middle, the latter rather indented on the median line. Posterior eye-row procurved, P. M. E. round, over one and one-half their diameter apart, closer to the equal P. S. E. Anterior eye-row procurved, shorter than the posterior, A. M. E. about as large as P. M. E., about once their diameter apart, very much closer to the equal A. S. E., which latter are well separated from the P. S. E. Two pairs of spines under tibiæ I. and II. Sternum one and one-fourth longer than broad, nearly as broad in front as at second coxæ, rounded to the pointed tip. The abdomen has a horny basal shield which extends but a short distance on the dorsum. The epigynum shows two oval openings marked in front by a continuous sinuous ridge.

One specimen from Ottawa, Canada. (W. H. Harrington.)

Anyphena fragilis, n. sp.

Length ♀ 5 mm.; ceph. 2 mm. long, 1.3 mm. broad; patella plus tibia IV. 1.8 mm. Cephalothorax pale yellowish brown, black around eyes, a black line reaching from between the P. M. E. to the indistinct dorsal groove. Sometimes the sides are rather more infuscated. Mandibles dark brown, with a pale spot at base; maxillæ and lip pale, fringed with black hair; legs pale whitish, with blackish rings at base, middle, and tip of tibia, base and tip of metatarsus and tip of tarsus; the bristles are arranged in lines so as to leave smooth spaces. Sternum pale, infuscated, darker on the sides. Abdomen pale, above with two rows of black spots, and some on each side; venter pale, spinnerets infuscated. Cephalothorax not much narrowed in front, radial furrows obscure, P. M. E. about twice their diameter apart, scarcely closer to the equal P. S. E. A. M. E. smaller than P. M. E., about their diameter apart, and nearly as far from the larger A. S. E. Mandibles rather large and stout, vertical. Legs short, two pairs of spines under tibiæ and metatarsi I. and II., the second pair at about middle of length; hind legs more

numerously spined. Sternum one and one-third longer than broad, broadest near middle, sides rounded. Abdomen slender, fully twice as long as broad; ventral furrow nearer to epigynum than to the spinnerets. The epigynum shows a transversely rounded area, trilobate behind, the median lobe smaller and pointed, in each side a curved reddish opening.

Jacksonville, Florida; April. Collected by Messrs. Laurent and Castle.

Theridium dorsatum, n. sp.

Length ♀ 4 mm.; femur I. 2.1 mm., femur III. 1.2 mm. Cephalothorax dark yellow-brown, brown on the edges, eye region blackish, and behind is a triangular brown spot with its apex on the dorsal groove. Abdomen grayish, with a pale central mark bordered by black, from the projections faint marks run to the sides; sides pale; venter black, with a large central triangular silvery spot, spinnerets surrounded with black; a curved black line reaches from the anterior portion of the abdomen across the sides to the middle of the venter, where it joins the dark ventral area; sternum brown; legs pale yellowish, with brownish bands at the middle and ends of the joints, those on middle of femora I. and II. are narrow and oblique. P. M. E. are about their diameter apart, A. M. E. much more than their diameter apart; sternum triangular, a little longer than broad in front; legs moderately long and slender, metatarsus I. about equal to tibia I.; abdomen a little longer than broad and not very high. The epigynum shows a rounded semi-triangular lobe projecting behind.

Olympia, Washington. (Trevor Kincaid). Readily known by the large silvery spot on venter.

Theridium elevatum, n. sp.

Length ♀ 4 mm.; femur I. 2 mm. Cephalothorax yellow, with a black stripe each side and one on the middle, the latter with a short lateral spur each side at the dorsal groove and growing narrower behind; mandibles with brown lines. Abdomen gray, mottled with white and brown; the white is in the form of curved lines; venter dark, with two white spots in front of the spinnerets; sternum yellow, with some short black lines reaching from the sides; legs pale, banded and thickly spotted with dark brown, bands at ends of joints, base and middle spotted. P. M. E. hardly their diameter apart; A. M. E. equal to P. M. E., more than their diameter apart; mandibles slender; sternum triangular, barely longer than broad in front; legs short and stout, femur

I. not quite twice as long as femur III., metatarsus I. barely longer than tibia I.; abdomen higher than long, globose; region of epigynum swollen; there is a small median triangular black projection or finger.

Brazos Co., Texas; Sept.

Plasiocrarius lobiceps, n. sp.

Length 1.5 mm. Cephalothorax yellowish with a black margin, each eye with a black ring, a black line on each side of the lobe; mandibles yellowish, legs and palpi yellowish, sternum red, black on margins; abdomen black, spinnerets pale. Head of male moderately elevated into a large lobe, bearing the P. M. E., which are large and scarcely twice their diameter apart; a hole on each side just behind the S. E.; the mandibles show a series of transverse lines on the outer side; legs moderately long, first pair longest, no spines above on the tibiae; sternum broad, triangular, bluntly pointed behind. Male palpi quite long; the tibia with a broad extension above and a hook on the inner side; the tarsus short, truncate at tip; the bulb, in side view, is constricted near the middle, the upper part crossed by two transverse dark lines, the black style coiled around the tip once, a small triangular hook near base of bulb. In the female the head is scarcely elevated; the epigynum shows a semicircular area limited by a concave ridge in front, from which there extends behind a gradually broadening furrow with its margins at tip, curved outward and backward.

One from Chicago, Ill., under leaves in October; others from Salineville, Ohio. (A. D. MacGillivray.)

Icius canadensis, n. sp.

Length ♀ 5 mm.; ceph. 2.4 mm. long, 1.9 mm. broad; tibia plus patella IV. 2 mm. The male but little smaller. Cephalothorax red-brown, black in eye-region; mandibles reddish; leg I. reddish except the yellowish tarsi, other legs wholly pale yellowish. Sternum infuscated; abdomen brownish with a narrow white line around base, and pale chevrons toward tip, venter pale gray, with a straight jet black stripe each side, and a narrow basal median spear-mark; a black spot each side at base of spinnerets; in ♂ more white hair around the A. M. E. Eye-region one and a fourth broader than long, broader behind than in front, first eye-row curved; eyes of second row half way between dorsal and lateral eyes; cephalothorax moderately high; mandibles vertical, with one stout tooth on inner edge of fang-groove. Legs moderately long, IV. pair longest, I. pair very stout, three pairs of spines on the tibia and

two on metatarsus I., metatarsus IV. spined only at tip, anterior coxæ separated by nearly width of labium. Sternum once and a third longer than broad, broadest between coxæ I. and II. Abdomen once and a half longer than broad, rounded at base, pointed behind, moderately high. The epigynum shows two oval cavities, more than their diameter apart, some distance in front of a posterior median indentation. The male palpus is short; the tibia has a short, sharp projection on the outside; the bulb projects beyond the base, and the upper part is much smaller than the lower, showing a curved tube on the outside, and terminating in a stout, straight, black stylus.

A few specimens from Ottawa, Canada; collected by Mr. W. H. Harrington.

DIPTERA FROM YUCATAN AND CAMPECHE.—I.

BY C. H. TYLER TOWNSEND, FRONTERA, MEXICO.

A few specimens of Diptera were taken in the Yucatecan region, in April and May, 1896, by the writer. The present paper describes the new species. More material from that interesting fauna will doubtless be secured in time, and will form the subject of future papers of this series. For an account of the peculiar bio-geographical aspects of the Yucatecan fauna and flora, the reader is referred to the writer's second paper on the Bio-geography of the Southwestern U. S. and Mexico (Trans. Texas Acad. Sci., 1897).

TABANIDÆ.

1. *Tabanus campechianus*, n. sp.

One ♀. April 25th. Taken near Campeche, between that place and Esperanza (State of Campeche). Seems to approach *T. nigrovittatus*, McQ., according to Osten-Sacken's description.

Length, $8\frac{1}{2}$ mm. Palpi almost white, with some white as well as black hairs. Face brownish, covered with a white bloom. Front brown, yellowish-gray dusted; frontal callosity nearly square, rounded on upper corners; a smaller longitudinal callosity above it twice as long as wide, and with a tendency to a linear elongation posteriorly. Callosities brown. Front parallel, about one-sixth width of head, parallel portion only a little more than twice as long as wide. First two joints of antennæ pale yellowish, second joint ending above in a sharp spur; third joint reddish-yellowish, annulate portion black, process of base angular, but not enough developed to form a right angle, greatest width

of third joint about twice the extreme basal width. Annulate portion of third joint hardly as long as the basal portion, about four times as long as wide. Thorax cinereous dusted, with a sparse short white pubescence, with four somewhat indistinct wide brownish vittæ. Pleura whitish pollinose. Scutellum cinereous, with a yellowish tinge on margin. Abdomen brownish-yellow, a well-defined, moderately broad median yellowish-white pollinose vitta of even width, becoming indistinct on sixth segment. A brown vitta on each side of and limiting the median vitta, forming a triangle on each side on third and a subarcuate marking on each side on second segment; but these brown vittæ are faintly represented in full width on second and third segments by a shading of brown supplementing the triangular and arcuate markings. On the outside of the brown vittæ on each side there is a lateral yellowish-white pollinose vitta like the median one but not so distinct; while still outside of this is another lateral brown vitta limiting the lateral white one on the inside and parallel with the edge of the abdomen on the outside. The fourth segment has the brownish-yellow considerably more tinged with brownish, and the fifth, sixth, and seventh are quite brownish. Pubescence very scanty, hairs of white portions whitish, of brown portions in main blackish, except on hind margins of posterior segments. Legs brownish-yellow, tips of tibiæ and bases of femora slightly brownish, but front tibiæ brownish on distal half; tarsi brownish, especially front tarsi, while the hind tibiæ and metatarsi are but little tinged with this colour. Wings fuscous-hyaline, costal cells and stigma distinctly yellow. Posterior cells all wide open, no stump nor even angle at the base of anterior branch of third vein. Eyes bare, no ocelli.

2. *Tabanus yucatanus*, n. sp.

Three ♀s. May 10th. Taken from horses, at the *cenote* of Xcolak, about ten miles southeast of Izamal, Yucatan. This is the first record of a Tabanid of any genus or species, so far as I can find, from Yucatan. Nor can I find any recorded from Campeche. I have searched through all the multitude of existing descriptions of *Tabanus* from North and South America, including Walker's and Bigot's numerous species, and have been unable to identify this and the preceding species with any of them.

Length, 10 to 11 mm. Differs from *campechianus* as follows: Palpi pale watery-yellowish. Gray bloom of face slightly tinged with

brownish. Front much narrower, about one-twelfth width of head, parallel portion fully five times as long as wide, just perceptibly narrowed anteriorly, with a callus swollen-conical or rounded posteriorly, prolonged into a second elongate spindle-shaped callus. Third antennal joint clearer reddish, annulate portion not so black; process more developed, ending in a sharp-pointed angle, basal part of joint rather widened and shortened; annulate portion short and comparatively stout, pointed elongate-conical, hardly three times as long as basal width in two of the specimens, slightly longer and comparatively less stout in the other. Thorax saturate yellowish-brown, with four indistinct whitish lines, the middle ones sometimes obsolete. Scutellum concolorous with thorax. Median whitish vitta of abdomen formed of whitish pubescence in triangles, under which the ground colour is seen to be paler than the brownish-yellow of rest of abdomen. Pale brownish vitta on each side of median one is composed of coalescent oblique markings, like a vitta broken at the incisures, the marking on each segment directed posteriorly outward. A nearly similar, hardly less broken lateral whitish vitta outside of this on each side; the last is bounded by a broken brown vitta on edge of abdomen, serrate on inner edge. Fourth to seventh, especially fifth to seventh segments, more deeply tinged with brown, or quite dark brown in ground colour. White incisures on sides of abdomen. White vittæ and incisures white-hairy, brownish vittæ black-hairy. Front femora quite brownish, hind metatarsi well tinged with brown, front tarsi almost black. Wings uniformly clear, except the pale yellowish oblique elongate stigma. Otherwise as in *campechianus*, including the venation, bare eyes, and absence of ocelli.

A NEW METHOD OF STUDYING NEURATION.

BY HENRY SKINNER, PROF. ENT. ACAD. NAT. SCI., PHILADELPHIA, PA.

The opprobrium cast on the lepidopterist has been that he did not study the anatomy of his specimens, but depended too much on maculation and colour. There has been much truth in the reproach, as there are few of us who would destroy a rare or unique specimen to examine the neuration. Fortunately the time has arrived when the neuration can be studied with the greatest ease and accuracy, and permanently re-recorded in a photograph, or, more strictly speaking, a radiograph. The anatomy of a living chrysalis may be studied without removing the

cocoon, and also the internal anatomy of the thorax and abdomen can be fairly well seen, and in time the process may be improved for this work. With the aid of the Röntgen or X rays and the photographic plate one could make a picture of the neurulation of the beautiful, rare and curiously shaped *Ornithoptera paradiseæ* and not disturb a scale on its superb wings. With the fluoroscope one could doubtless see all the neurulation without even going to the trouble of making a picture. This is indeed a wonderful age, and in the future no entomologist will have any excuse for not studying the neurulation of the lepidoptera, as he cannot say that he must denude the wings of his specimens, bleach them and mount in balsam as of old and thus destroy them.

BOOK NOTICES.

GUIDE TO THE GENERA AND CLASSIFICATION OF THE NORTH AMERICAN ORTHOPTERA. By S. H. Scudder: 8 vo., pp. 89. W. H. Wheeler; Cambridge, 1897. (Price \$1.00.)

The above work, like all of Dr. Scudder's books, is exactly what the title states. It is simply a guide for the use of students of the Orthoptera, by means of which they may determine the genera of their specimens. It consists of excellent and most carefully prepared tables of the seven families into which the Orthoptera of North America are divided. These are followed by most valuable bibliographical notes, in which the student is referred under the head of each family of insects to all the works which refer to it. Then follows a full list of all the works which refer to North American Orthoptera, arranged alphabetically by authors and a complete index. All who have attempted to study Orthoptera know how badly such a book was wanted, and it is well for the science of entomology that the work was done by such a careful and experienced hand. J. F.

THE GENERA OF NORTH AMERICAN MELANOPLI. By S. H. Scudder. (Proc. Am. Acad. of A. and S. V. 32, pp. 195-206. Jan., 1897.)

Almost simultaneously with Dr. Scudder's "Guide to the Genera of Orthoptera" two other important and extremely useful papers appeared, one on "*The Genera of North American Melanopli*" and the other on "*The Species of the Genus Melanoplus*." These are both really advance issues of chapters in Dr. Scudder's great work on the *Melanopli*, which is to be published by the U. S. National Museum. The *Melanopli* are divided into 30 genera, 17 of which are new and 4 have been previously published by the author. The genus *Melanoplus* is characteristically American and is widely disseminated. There are 131 species recognized grouped under 28 series. The name *furcula* is given to the processes of the last dorsal segment of the male abdomen.

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THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXVII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(*Continued.*)

With this paper we begin the consideration of the Lamiinæ, the third great subfamily of Longhorns. They have recently been worked up by Mr. Leng and Dr. Hamilton in a joint publication* which has been largely used and followed in the preparation of the succeeding pages. The essential characters are to be found in the oblique sulcation of the outer side of the front tibiæ, the lack of prothoracic margin and the cylindrical pointed terminal joint of the palpi. None of the Canadian forms offer exceptions to the above rule. It will also be noticed that the front of the head is usually vertical instead of being oblique or nearly horizontal. Compare a *Prionus*, *Romaleum* and *Saperda* and this point will be made clear.

In order to construct a dichotomous table of the Canadian genera it has been necessary to disturb the sequence somewhat. The student will understand, however, that no implication of relationship is meant to be expressed in the succession as adopted in this paper, but convenience of identification has been given the most prominence. Probably the only characters that will be found difficult to a beginner are those relating to the claws (which, however, are sufficiently commented upon in the table), the antennal cicatrix and the front coxæ. The cicatrix is a sort of scar which is to be easily seen in *Monohammus* near the tip of the first antennal joint; it is, in the above genus, limited by a distinct raised line. The angulation of the front coxal cavities is readily noticeable in the same insect, especially if the leg be removed, when it is seen that the cavity, instead of being circular in outline, has a V-shaped nick in the outer margin.

It is, perhaps, hardly necessary to state so self-evident a fact as that the "Classification" of Drs. Leconte and Horn has furnished the chief

*The Lamiinæ of North America. Trans. Am. Ent. Soc., XXIII.

material for the table, which is in the main only a slight rearrangement of the numerous short ones of their own.

- Humeral angles not prominent, wings wanting. Form very convex, prothorax rounded, unarmed. Elytra with bands of pubescence *Ipochnus*.
 Humeral angles usually distinct, wings and elytra fully developed, not abbreviated. 2.
2. Usually large or moderate-sized species; elytra not spinose at base. 4.
 Small or minute species. Elytra with a spine or gibbosity near the scutellum. 3.
3. Humeri rounded, elytra very convex and with large spine near scutellum *Cryptinus*.
 Humeri distinct, elytra less convex, with oval gibbosity near scutellum *Psenocerus*.
4. Scape of antennæ with apical cicatrix. Nearly all large species, antennæ sometimes greatly elongate in the males. Prothorax with lateral spine present, often very large. 5.
 Scape of antennæ without apical cicatrix 6.
5. Legs long, anterior pair elongate in the males. *Monohammus*.
 Legs equal, not elongate *Goes*.
6. Front coxal cavities rounded. Body usually broad. Elytra attenuate behind. Antennæ usually very long in the males. 7.
 Front coxal cavities angulate 14.
7. Scape of antennæ club-shaped. Prothorax with dorsal tubercles and large, acute, nearly median lateral spine. *Acanthoderes*.
 Scape of antennæ nearly cylindrical. Lateral spine or tubercle, if present, behind the middle 8.
8. Female without elongated ovipositor. 9.
 Female with elongated ovipositor 12.
9. Prothorax fully tuberculate or angulate. Mesosternum broad. *Leptostylus*.
 Prothorax distinctly angulate, or more frequently with a short spine or acute tubercle behind the middle. Mesosternum narrow . . . 10.
10. Antennæ without traces of ciliæ beneath, first joint of hind tarsus as long as the next two. Prosternum narrow, body without erect hairs. *Liopus*.
 Antennæ distinctly ciliate beneath, first joint of hind tarsi as long as next three 11.

11. Elytra without lateral carina, usually with transverse angulated markings.....*Lepturges*.
Elytra with lateral carina and marked with numerous small black spots.....*Hyperplatys*.
12. Body above pubescent, without intermixed erect hairs; antennæ with at least joints 3-4 densely fringed with hairs beneath.....*Acanthocinus*.
Body above with erect hairs mixed with the pubescence.....13.
13. Mesosternum broad, antennæ not much longer than the body and not ciliate beneath except feebly on the scape.....*Graphisurus*.
Mesosternum narrow, antennæ of male twice as long as the body, ciliate beneath.....*Ceratographis*.
14. Antennæ very elongate, prothorax cylindrical, slightly tubularly narrowed behind (in our species) without lateral armature or dorsal tubercles. Colour black.....*Dorcaschema*.
Antennæ not more than moderately elongate.....15.
15. Claws (at least on front tarsi) divaricate; *i. e.*, extending in a plane at right angles to the length of last tarsal joint.....17.
Claws divergent; *i. e.*, not in plane as described above, but forming an angle.....16.
16. Rather large species, prothorax sinuate or feebly tuberculate on sides, front of head large, flat. Shape *Saperda*-like. Claws simple.....*Oncideres*.
Rather small species. Black, front of head in part and sides of prothorax yellow, claws cleft.....*Amphionycha*.
17. Claws simple (except outer one of front and middle tarsi in some male *Saperda*).....18.
Claws cleft or appendiculate.....22.
18. Smaller species, prothorax spinose or tuberculate on sides.....19.
Larger species, prothorax never armed nor tuberculate.....*Saperda*.
19. Thighs clavate, vertex concave, antennal tubercles prominent.....20.
Thighs not clavate, vertex flat or convex, antennal tubercles not prominent. Eyes coarsely granulated, lower lobe as wide as long, body with flying hairs, antennæ pilose, joints 5-10 shorter, equal.....*Eupogonius*.
20. Lower lobe of eyes elongate. Lateral spines of prothorax large, median. Pubescence mottled, gray and black, mixed with short, scattered hairs on elytra.....*Hoplosia*.
Lower lobe of eyes subquadrate or subtriangular.....21.

21. Prothorax with lateral spine, flying hairs long *Pogonocherus*.
 Prothorax with feebly rounded sides, pubescence short *Ecyrus*.
 22. Eyes not divided, prothorax not distinctly tuberculate, form
 slender *Oberca*.
 Eyes completely divided, the upper and lower portions widely separated,
 prothorax with large lateral tubercle, form stout. Colour
 red with black spots *Tetraopes*.

IPOCHUS, Lec.

A record of the Californian species *I. fasciatus*, Lec., is existent upon the Society's list, but I am unaware of the original authority. It is a convex, heavily-built beetle, blackish, pubescence long, erect. Prothorax with large punctures, and bearing a transverse row of four spots of white pubescence. Elytra with irregular transverse bands of whitish pubescence, varying in width. Length, .18-.30 inch.

CYRTINUS, Lec.

Represented by one extremely small, somewhat antlike species, *C. pygmaeus*, Hald., easily recognized by the convex elytra with rounded humeri and large juxta-scutellar spine. Colour nearly black, elytra with a whitish pubescent spot before the middle, antennæ annulate. Length, .08-.12 inch. Said to occur on dead oak branches.

PSENO CERUS, Lec.

P. supernotatus, Say (fig. 30), is recorded as boring during larval life in the stems of grape, currant, gooseberry, and apple. I have frequently beaten it from crab-apple trees. It is a small beetle of somewhat elongate form, reddish to nearly black, the elytra with a darker blotch behind the middle which is bordered anteriorly and posteriorly by a band of whitish pubescence, the anterior band usually much the narrower and interrupted near the suture. Antennæ shorter than body in both sexes. Small specimens are often almost entirely black, and may lack the elevation at the base of the elytra. Length, .12-.24 inch.

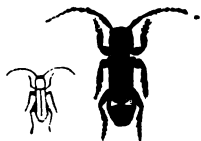


FIG. 30.

MONOHAMMUS, Serv.

Includes several very large species with long legs and antennæ, especially in the males. Some or all of them are injurious to pine lumber, and *scutellatus* and *confusor* are usually abundant in the eastern

coniferous forests. *M. maculosus* is more essentially western, but often common, while *marmorator* is very rare. Dr. Horn separates the species thus:

- A. Tips of elytra rounded, sutural angle acute or spiniform, especially in the male. Piceous or black, more or less bronzed, elytra irregularly mottled with patches of brownish and grayish or whitish pubescence. Punctuation very coarse and close. .66–1.06 inch. *maculosus*, Hald.
- AA. Tips of elytra rounded, sutural angle not prolonged, usually very obtuse.



FIG. 31.

- b. Black, distinctly bronzed. Elytral patches of pubescence few or wanting; female antennæ annulate. Scutellum densely clothed with white pubescence. .64–1.24 inch. (fig. 31), *scutellatus*, Say.
- bb. Brown, elytra sparsely mottled with patches of gray and brown pubescence. Female antennæ not annulate. 1.10–1.24 inch. (fig. 32) . . *confusor*, Kirby.

- AAA. Tips of elytra obliquely prolonged and acute. Elytra brownish, surface feebly punctured, clothed with ochreous white and brown patches intermixed. 1.00 inch. . . . *marmorator*, Kirby.



FIG. 32 (after Harris).

GOES, Lec.

Contains several species, mostly of rather or quite large size, resembling *Saperda* somewhat in form, but with a strong lateral thoracic spine. All have the upper surface mottled with pubescence, sometimes arranged in tolerably distinct transverse bands. Since only one of the North American species is lacking from Canada, we reproduce Dr. Horn's synopsis as far as it concerns us:

- A. Surface colour of body brownish; antennæ of male at most one and one-quarter times the length of the body.
- b. Elytra with conspicuous denuded fascia one-third from apex.
 Pubescence of surface white. 1.00 in.....*tigrina*, DeG.
 Pubescence ochreous or luteous, basal region of elytra darker, less pubescent. .92 in.....*pulchra*, Hald.
 Pubescence marmorate, whitish and ochreous, the apical region darker ochreous. .44-.52 in.....*debilis*, Lec.
- bb. Elytra without conspicuous denuded fascia, pubescence cinereous or almost white, uniform, sometimes with faint trace of denuded fascia. .80-.88 in.....*pulverulenta*, Hald.
- AA. Surface colour black, shining, pubescence whitish, a small conspicuous black spot on each elytron, one-third from apex. Antennæ of male twice as long as the body. .40-.44 in.....*oculata*, Lec.

A few notes on food-habits have been published, from which it appears that *debilis* has been found on hickory and white oak, *tigrina* on hickory (as an adult) and in oak (as larva); *pulchra* and *oculata* are found in the mature stage on hickory, while the larva of *pulverulenta* is said to bore in wild cherry and in living beech trees.

ACANTHODERES, Serv.

The three species belonging here may be separated from those immediately following by their antennæ, in which the first joint, or scape, is strongly clavate. They are brownish insects, maculate above with whitish or ashy pubescence, of rather robust form, the upper surface rough, the femora much swollen. Prothorax with strong, sharp lateral spine. The differentials are given by Dr. Horn, thus:

- A. Sutural region of elytra vaguely grooved, the groove limited on each elytron by a feeble costa. Elytra with a moderately broad transverse band of white in front of middle, broadly interrupted at suture. .40 in.....*quadrigibbus*, Say.

AA. Sutural region not grooved, elytra with a more or less distinct M-shaped black mark behind the middle of each.

Base of elytra irregular, an oblong obtuse umbone at middle of base. .42-.48 in. *decipiens*, Hald.

Base of elytra regularly convex without umbone. .80 in. *Morrisii*, Uhler.

The recorded food-plants of *A. quadrigibbus* are oak, hickory, beech, and hackberry. I have found *A. decipiens* on oak logs, but am unaware of the larval habits.

LEPTOSTYLUS, LEC.

Numerous species are known from Canada, and are arranged mainly on the plan offered by Dr. Horn. The name *commixtus* is replaced by *sexguttatus*. The lateral tubercle of the prothorax is always blunt, sometimes obsolete.

A. Elytra without asperities and scalelike hairs.

Prosternum between the coxæ as wide as a coxal cavity, elytra slightly truncate at tip. Robust, convex, prothorax with whitish pubescence forming a broad lateral stripe each side, bounded internally by a black stripe which is formed of a row of denuded tubercles, the discal area brownish. Elytra with a broad irregular transverse post-median area of whitish pubescence. .16-.36 in. *macula*, Say.

Prosternum narrower than a coxal cavity, tips of elytra separately rounded, thorax moderately densely punctured on flanks as well as disk. Yellowish or reddish brown, elytral surface uneven, basal angles black, polished; a dark brown irregular band often extends backward from these angles to the middle, thence narrows towards suture, followed posteriorly by one or two black spots, but these markings may be absent. Three large basal tubercles on prothorax, and three smaller, sometimes obsolete, subapical ones. .40 in. *collaris*, Hald.

AA. Elytra with asperities or tubercles, bearing at their summits short black scalelike hairs.

b. Thorax densely punctured, elytra with densely placed coarse deep punctures. Colour variable, elytra mottled with grayish pubescence. .28-.40 in. *sexguttatus*, Say.

bb. Thorax not densely punctured, elytral punctures not closely placed, often inconspicuous or concealed. Legs not hairy.

- c. Antennæ longer than the body in both sexes, the third joint only slightly longer than the fourth. Punctuation of thorax regular.

Elytra very indistinctly punctured, especially at apex, the disk with angulate fascia behind the middle, tips feebly obliquely truncate. .16-.24 in.....*biustus*, Lec.

Elytra distinctly punctured over entire surface, disk with acutely angulated fascia, apex slightly prolonged, not obliquely truncate. .16-.24 in.....*parvus*, Lec.

- cc. Antennæ scarcely longer than the body even in the male, the third joint conspicuously longer than the fourth. Robust, brownish, surface of prothorax roughly tuberculate, pubescent, punctures sparse, irregularly placed. Elytra with raised tubercles or ridges, and with grayish and whitish pubescence which tends to form a post-medial transverse band broadest at the suture, the pubescence becoming darker anteriorly. Tip dark. .32-.40 in. (fig. 33).....*aculifer*, Say.



FIG. 33.

The food plants of several of the above are recorded. *L. macula* is known to breed in beech, hickory, walnut, butternut, and chestnut; *sexguttatus* in pine; and *aculifer* in oak, apple, sycamore, and osage orange.

RARE BUTTERFLIES.—On the 8th day of May, Mr. James Walker captured, in a cedar swamp, near Orillia, Ont., a specimen of *Thecla tata*, Edw. This butterfly has hitherto only been recorded in Canada, from London and York Mills in this Province, and from a few localities in the Province of Quebec.

Mr. C. E. Grant, of Orillia, has recently taken a specimen of the melanic form of *Colias philodice*, the yellow on the wings being replaced by dark scales. It is apparently somewhat similar to the aberration recorded by Mr. Dwight Brainerd (C. E., XXVIII., p. 305), which he took at Edgartown, Mass., last year. Mr. Grant has also taken at Orillia, for the first time, *Papilio troilus* and *Lycæna comyntas*, making the total number of butterflies from that locality sixty-two.

Papilio Ajax (a perfect specimen) has again been seen at Port Hope on the 24th of July.

A GENERIC REVISION OF THE HIPOCRITIDÆ (ARCTIIDÆ).

BY HARRISON G. DYAR, PH. D., NEW YORK.

The earliest use of the term Arctiidæ is referred by Dr. Packard to Leach (1815). This is antedated by Hübner's Tentamen terms, Hipocritæ and Hypercompæ. The latter is unavailable, as Hypercompa becomes a synonym. I do not find any plural terms for the family before Hübner.

The faunas of Europe and America are here united. I have included the Indian genera as far as possible, but could not do so completely, as Hampson's work is much less available here than usual. Hampson does not recognize the Lithosiidæ on the character of the absence of ocelli, but unites under the term Arctiidæ all the species here grouped as Hipocritidæ with Lithosiidæ, Nyctemeridæ, Pseudoipsidæ and Nolidæ. His subdivisions of this aggregation are based on other characters, so that some of the genera that I have not seen can not be placed in the table from his figures and descriptions. Especially Castalba, Tatargena, Sidyma may be Hipocritidæ, though placed in Hampson's Lithosiinæ, while Rhodogastrina, Pangora, Nicæa and Leucopardus I can not place from lack of the type species. I do not think that this affects the present revision, as these genera seem to be distinct from any of those included. As far as the American genera are concerned, I exclude Cydosia and Cerathosia, as they are probably Noctuid. Euverna is transposed to the Arctiinæ and becomes synonymous with Ectypia, a result due to the study of additional material, which I owe to Prof. Smith. Cynia divides into three genera on venational characters, one of the sections supplanting Pareuchaetes; Halisidota divides into two genera. The names Elpis and Neoarctia fall before European terms and a new genus is required for the species *virginalis*, Boisd. Pygoctenucha is transferred from the Euchromiidæ on account of the presence of vein 8 of secondaries. Three genera, Eucereon, Bertholdia and Euerythra, lack vein 8 and would seem strictly to be Euchromiidæ, but I hesitate to transfer them, as the habitus is Arctian, the larvæ are unknown and the condition of vein 8 is distinctly led up to in Eupseudosoma, which has a short spurlike vein 8 in the male and none in the female. The Phaegopterinae may be further modified when the large South American fauna is worked up. In the meantime I dedicate to Mr. Schaus the new section of Halisidota, which he has shown to be of generic value (Journ. N. Y. Ent. Soc., IV., 138) in recognition of his work on this group as well as on the allied Euchromiidæ and in the anticipation of still further and more comprehensive labours.

The following table is based on the work of Prof. J. B. Smith, which appeared in CAN. ENT. some years ago, and was worked over in the revision of Bombyces by Mr. Neumögen and myself. Following the table is a list of genera and species; italicized names are North American. Bibliographical references are omitted, and they can readily be found in Kirby's catalogue if wanted. The types of genera are recognized as determined by Kirby.

KEY TO THE GENERA.

1. Head prominent, tongue moderate or strong 2.
 Head more or less retracted, tongue weak or small 13.
2. Secondaries large and ample, habitus lithosiiform 3.
 Secondaries trigonate, often small, primaries pointed at apex 44.
3. Vein 5 of secondaries faint or absent 4.
 Vein 5 distinct 5.
4. Primaries long and narrow *Coscinia*.
 Primaries broad, trigonate *Eubaphe*.
5. Primaries broad, trigonate 6.
 Primaries narrow, apices rounded *Utetheisa*.
6. Vein 5 of secondaries arising close to vein 4 7.
 Vein 5 of secondaries from near the middle of the cell *Dea*.
7. No accessory cell; veins 7 to 10 of primaries stalked 10.
 No accessory cell; vein 10 free, from the discal cell *Axiopana*.
 Accessory cell present, vein 10 arising from it 8.
8. Anal angle of secondaries rounded in the male, spurs of tibiæ long . 9.
 Anal angle produced to a point; spurs very short *Argina*.
9. Vein 6 arising beyond the angle of the discal cell *Macrobrochis*.
 Vein 6 arising from the discal cell *Callimorpha*.
10. Vein 11 free from vein 10 11.
 Vein 11 almost or quite touching vein 10 12.
11. Secondaries over three-fourths the length of primaries *Haploa*.
 Secondaries less than three-fourths the length of primaries . . . *Areas*.
12. Secondaries with veins 6 and 7 from the cell *Sebastia*.
 Secondaries with veins 6 and 7 stalked *Calpenia*.
13. Vein 8 of secondaries wanting *Euerythra*.
 Vein 8 present 14.
14. Veins 7 to 10 of primaries stalked from apex of cell 15.
 Vein 10 arising from the discal cell 38.
15. Vein 11 free 16.
 Vein 11 joined to vein 10 to form an accessory cell *Hipocrita*.

16. Median spurs of hind tibiæ wanting 17.
 Median spurs of hind tibiæ present..... 26.
17. Anterior tibiæ unarmed 18.
 Anterior tibiæ armed at tip 20.
18. Antennæ of male simple..... 19.
 Antennæ of male pectinated..... *Leptarctia*.
19. Palpi exceeding the front..... *Ecpantheria*.
 Palpi not reaching the front..... *Cretonotus*.
20. Inner prong of tibial armour-plate produced into a spine..... 21.
 Inner prong not much produced, spine short..... 24.
21. Wings of male with the outer margin upright, of female
 aborted..... *Pachylischia*.
 Wings narrow, outer margin somewhat oblique..... 22.
22. Costa of primaries convex..... *Seirarctia*.
 Costa of primaries straight 23.
23. Robust, with hairy vestiture, blackish *Alexides*.
 Slenderer, the vestiture smooth, white *Aloa*.
24. Male and female antennæ simple *Phissama*.
 Male antennæ pectinated, female simple..... 25.
 Male and female antennæ pectinated..... *Estigmene*.
25. Wings with short erect scales, slightly transparent *Diaphora*.
 Wings with appressed scales, not transparent..... *Hyphantria*.
26. Antennæ of male simple..... 27.
 Antennæ of male pectinated..... 30.
27. Vestiture of thorax scaly, appressed..... 28.
 Vestiture hairy, smooth *Pericallia*.
 Vestiture hairy, short, erect 29.
28. Wings broadly trigonate *Camptoloma*.
 Wings elongate, more rounded..... *Arachnis*.
29. Apex of primaries acuminate..... *Pyrrharctia*.
 Apex of primaries square *Phragmatobia*.
30. Ocelli close to margin of eye (about the diameter of the ocellus)..... 31.
 Ocelli distant from the margin of the eye..... 36.
31. Primaries broad, outer margin somewhat erect 32.
 Primaries narrower, outer margin somewhat oblique *Alpheia*.
32. Body slender, secondaries ample..... *Diacrisia*.
 Body more robust, secondaries moderate..... 33.
33. Female wingless *Ocnogyna*.
 Female with fully-developed wings 34.

34. Costa of primaries not depressed before apex 35.
 Costa of primaries depressed before apex *Rhyparia*.
35. Wings opaque *Spilosoma*.
 Wings somewhat translucent *Thygorina*.
36. Front narrowed above and below *Arctinia*.
 Front square, not narrowed 37.
37. Rough hairy, wings subdiaphanous *Eucharia*.
 Somewhat smooth, wings opaque *Hyphoraia*.
38. Accessory cell wanting 39.
 Accessory cell present 40.
39. Wings broad, size large, vestiture smooth and short ... *Platyrepia*.
 Wings moderate, size smaller, vestiture rough *Euprepia*.
 Wings elongate, size very small *Kodiosoma*.
40. Spurs of posterior tibiæ long or moderate 41.
 Spurs of posterior tibiæ short *Ectypia*.
 Median spurs of posterior tibiæ wanting *Ammobiota*.
41. Size small, body rather slender 42.
 Size large, body more robust 43.
42. Wings short and broad *Parasemia*.
 Wings long and narrow *Pygoctnucha*.
43. Wings broad *Arctia*.
 Wings narrow *Antarctia*.
44. Vein 8 of secondaries absent 52.
 Vein 8 present 45.
45. Veins 7 to 10 of primaries stalked *Cynia*.
 Vein 10 from the discal cell 46.
46. Accessory cell present 47.
 Accessory cell absent 48.
47. Antennæ long, secondaries proportionately small *Theages*.
 Antennæ shorter, secondaries larger *Pygarcia*.
48. Primaries broad, secondaries proportionate *Euchates*.
 Primaries narrow, produced at apex, secondaries smaller 49.
49. Male antennæ simple *Pelochyta*.
 Male antennæ pectinate 50.
50. Vein 8 of secondaries double *Schausia*.
 Vein 8 long, single *Halisidota*.
 Vein 8 very short, spurlike 51.
51. Vein 5 of secondaries present *Acmilia*.
 Vein 5 of secondaries wanting *Eupseudosoma*.

52. Vein 10 of primaries from the discal cell *Eucereon*.
 Veins 7 to 10 of primaries stalked *Bertholdia*.

LIST OF GENERA AND SPECIES.

- Coscinia*, Hübn. (= *Eulepia*, Curt. =
Emydia, Boisd.)
striata, Linn.
cribraria, Linn.
Eubaphe, Hübn. (= *Crocota*, Hübn.
 = *Holomelina*, H. S.)
lacta, Guér.
intermedia, Graef.
ostenta, H. Edw.
costata, Str.
opella, Grt.
immaculata, Reak.
aurantiaca, Hübn.
Uletheisa, Hübn. (= *Deiopeia*,
 Steph.)
bella, Linn.
venusta, Dalm.
ornatrix, Linn.
pulchella, Linn.
formosa, Boisd.
Doa, Neum. & Dyar.
ampla, Grt.
dora, N. & D.
Axiopoetra, Ménét.
maura, Eichw.
Macrobrochis, H.-S.
gigas, Walk.
Callimorpha, Latr. (*Euplagia*, Hb.
 = *Tripura*, Moore.)
dominula, Linn.
quadripunctaria, Poda.
prasena, Moore.
pallens, Hamps.
principalis, Koll.
similis, Moore.
plagiata, Walk.
equitalis, Koll.
nyctemerata, Moore.
Argina, Hübn.
argus, Koll.
syringa, Cram.
cribraris, Clerck.
Haploa, Hübn.
clymene, Brown.
colona, Hübn.
Lecontei, Guer.
contigua, Walk.
confusa, Lyman.
Areas, Walk. (= *Melanareas*, Butl.)
galactina, Van d. Hoef.
imperialis, Koll.
Sebastia, Kirby (= *Moorea*, Hamps.)
argus, Walk.
Calpenia, Moore.
khasiara, Moore.
Saundersi, Moore.
Euerythra, Harvey.
phasma, Harv.
trimaculata, Smith.
Hipocrita, Hübn. (= *Euchelia*,
 Boisd.)
jacobææ, Linn.
Cretonotus, Hübn.
interruptus, Gemel.
Ecpantheria, Hübn.
garsoni, Oberth.
ocularia, Fab.
permaculata, Pack.
Leptarctia, Stretch.
californiæ, Walk.

- Pachylischia*, Ramb. (= *Artimelia*, Ramb.)
 corsica, Ramb.
 Latreillei, Godt.
Seirarctia, Packard.
 echo, Sm. & Abb.
Alexicles, Grote.
 aspersa, Grt.
Aloa, Walk. (= *Bucæa*, Walk.)
 emittens, Walk.
 simplex, Walk.
 fumipennis, Hamps.
Phissama, Moore (= *Amphissa*, Walk.)
 transiens, Walk.
Estigmene, Hübn. (= *Leucarctia*, Pack.)
 acraea, Drury.
 Rickseckeri, Behr.
 albida, Stretch.
Diaphora, Stephens.
 mendica, Clerck.
Hyphantria, Harris.
 cunea, Dru.
Camptoloma, Felder.
 interioratum, Walk.
 binotatum, Butler.
Arachnis, Geyer.
 aulea, Geyer.
 picta, Pack.
 maia, Ottolengui.
 citra, N. & D.
 zuni, Neum.
Pericallia, Hübn.
 matronula, Linn.
Pyrreharctia, Packard.
 isabella, Sm. & Abb.
- Phragmatobia*, Steph.
 fuliginosa, Linn.
 assimilans, Walk.
Rhyparia, Hübn.
 purpurata, Linn.
Diacrisia, Hübn. (= *Euthemona*, Steph.)
 sannio, Linn.
Ocnogyna, Lederer (= *Cletis*, Ramb. = *Somatrichia*, Kirb.)
 zoraida, Grasl.
 maculosa, Herm.
 parasita, Hübn.
Spilosoma, Steph. (= *Spilarctia*, Butl.)
 urticæ, Esp.
 lubricipeda, Linn.
 punctarium, Stoll.
 lutea, Hufn.
 virginica, Fab.
 prima, Slosson.
 antigone, Strecker.
 latipennis, Stretch.
 vestalis, Pack.
 multiguttum, Walk.
 sangaicum, Walk.
 subfascia, Walk.
 dalbergiæ, Moore.
 punctatum, Moore.
 dentilinea, Moore.
 stigmata, Moore.
 mona, Swinhoe.
 gopara, Moore.
 ummera, Swinhoe.
 bimaculatum, Moore.
 jucundum, Butler.
 flavale, Moore.
 todarum, Moore.
 montanum, Guer.

- strigulatum, Walk.
 castaneum, Hamps.
 rubilinea, Moore.
 erythrophelps, Hamps.
 brunneum, Moore.
 casignetum, Koll.
 bifasciatum, Hamps.
 comma, Walk.
 lacteatum, Butl.
 melanopsis, Walk.
 rubitinctum, Moore.
 erythrozona, Koll.
 fuscipenne, Hamps.
Thygorina, Walker.*
 indica, Guer.
 multivittata, Moore.
 nigrifrons, Walk.
 unifascia, Walk.
 discalis, Moore.
 obliquivitta, Moore.
 venosa, Moore.
 flavens, Moore.
 biseriata, Moore.
 sordida, Moore.
 sikkimensis, Moore.
 eximia, Swinhoe.
 rhodophila, Walk.
 melanosoma, Hamps.
Alphæa, Walker.*
 fulvohirta, Walk.
 florescens, Moore.
 imbuta, Walk.
 quadriramosa, Koll.
 tigrina, Moore.
 leopardina, Moore.
 vittata, Moore.
 biguttata, Walk.
 nigricans, Moore.
 dentata, Walk.
 pannosa, Moore.
 siaphi, Moore.
Arctinia, Eichw. (= *Elpis*, Dyar. =
 Eupatolinis, Butl.)
 cæsarea, Gæze.
 rubra, Neumægen.
 vagans, Boisd.
Eucharia, Hübn. (= *Neoarctia*, N.
 & D.)
 casta, Esper.
Brucei, H. Edw.
Beanii, Neum.
Hyphoraia, Hübn. (= *Platarctia*,
 Pack.)
 aulica, Linn.
 hyperborea, Curt.
 Yarrowi, Stretch.
Platyrepia, Dyar.
 virginalis, Boisd.
Euprepia, Ochsenheimer*
 pudica, Esp.
 fasciata, Esp.
 intercalaris, Evers.
 virgo, Linn.
 virguncula, Kirby.
 michabo, Gt.
 intermedia, Stretch.
 parthenice, Kirby.
 rectilinea, French.
 anna, Grote.
 ornata, Pack.
 arge, Dru.
 Quensellii, Paykull.
 oblitterata, Stretch.
 proxima, Guer.

*See Hampson for the generic synonymy.

- cervinoides*, Streck.
Bolanderi, Stretch.
Blakei, Grote.
superba, Stretch.
favorita, Neum.
Williamsii, Dodge.
phyllira, Dru.
figurata, Dru.
placentia, Sm. & Abb.
nais, Dru.
phalerata, Harris.
vittata, Fab.
Kodiosoma, Stretch.
fulvum, Stretch.
Ectypia, Clemens (= *Euverna*,
N. & D.).
bivittata, Clemens.
clio, Packard.
Ammobiota, Wallengren.
festiva, Hufn.
Parasemia, Stephens.†
plantaginis, Linn.
petrosa, Walk.
Pygoctnucha, Grote.
Harrisii, Boisd.
terminalis, Walk.
Robinsonii, Boisd.
funerea, Grote.
Arctia, Schrank (= *Epicallia*, Hbn.
= *Hypercompa*, Hbn.
= *Zoote*, Hübn.)
villica, Linn.
caja, Linn.
opulenta, H. Edw.
Antarctia, Hübner.
vulpina, Hübn.
- Cynia*, Hübn. (= *Tadana*, Walk. =
Pareuchætes, Grt.)
tenera, Hübn.
sciurus, Boisd.
insulata, Walk.
Pygarctia, Grote.
abdominalis, Grote.
vivida, Grote.
murina, Stretch.
Bolteri, H. Edw.
elegans, Stretch.
scepsiformis, Graef.
albicosta, Walk.
Euchætes, Harris.
egle, Dru.
eglenensis, Clemens.
oregonensis, Stretch.
perlevis, Grote.
Spraguei, Grote.
zonalis, Grote.
Pelochyta, Hübn. (= *Amerila*, Walk.)
astreæ, Dru.
Halisidota, Hübn. (= *Lophocampa*,
H. = *Euhalisidota*, Grt.)
tessellaris, Sm. & Abb.
Harrisii, Walsh.
cinctipes, Grote.
Edwardsii, Pack.
labecula, Grote.
maculata, Harris.
alni, H. Edw.
Agassizii, Pack.
minima, Neum.
caryæ, Harris.
pura, Neum.
longa, Grt.
propinqua, H. Edw.

†See Neumogen and Dyar for the generic synonymy.

| | |
|-------------------------|------------------------------|
| bicolor, Walk. | albigutta, Boisd. |
| Courregesi, Dognin. | lugens, Hy. Edw. |
| atra, Druce. | <i>Aemilia</i> , Kirby. |
| daruba, Druce. | roseata, Walk. |
| ergana, Druce. | occidentalis, French. |
| aconia, H.-S. | <i>Eupseudosoma</i> , Grote. |
| thalassina, H.-S. | floridum, Grote. |
| <i>Schausia</i> , Dyar. | <i>Eucereon</i> , Hübn. |
| argentata, Pack. | carolinum, Hy. Edw. |
| subalpina, French. | <i>Theages</i> , Walker.* |
| sobrina, Stretch. | strigosa, Walk. |
| mixta, Neum. | <i>Bertholdia</i> , Schaus. |
| ingens, Hy. Edw. | specularis, H. S. |
| ambigua, Strecker. | trigona, Grote. |

LARVA OF TITANIO HELIANTHIALES, MURTFELDT.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Miss Murtfeldt's interesting discovery of this leaf-mining Pyralid suggested to me the inquiry as to how far the setæ of the larva had been affected by this unusual habit. The leaf-mining Tineids have tubercles iv. and v. remote, while all the Pyralids that I have seen have these tubercles united. I was interested to learn how far fixed this Pyralid character is, especially as the setæ have been studied in but a few microlepidoptera.

Miss Murtfeldt very kindly sent me her alcoholic specimens. The larva has the flattened retracted head and large cervical shield of a leaf-miner, but the body is not flattened and the slender legs are normal. The setæ are perfectly normal for the Pyralidæ, iv. and v. closely united. There is also the little additional tubercle before and above the spiracle, which is present in other Pyralids and also in the Cossidæ. In fact, the larva strongly suggests a little Cossid, except that the feet are longer and the circle of crotchets is broken on the outside. The pupa tells a different story. It might belong to the Pyraloid Obtectæ, which Dr. Chapman says have obtect characters in practically all respects except the possession

|| In the male type vein 10 of primaries arises from the apex of discal cell on one wing, distinctly stalked on the other wing, but with a basally directed spur, indicating an accessory cell. On secondaries the supplementary vein preceding vein 8 is very short.

*Type of *Theages* not examined. The characters in the table are those of our species.

of traces of maxillary palpi ; but I can only find with difficulty a slight trace of the maxillary palpi. This would make it almost a true obtect pupa, which is far removed from the Cossidæ.

The following descriptions contain some details not specially mentioned in Miss Murtfeldt's article :

Larva.—Head rounded, flattened, small, partly retracted ; clypeal sutures depressed, upper segment of labium forming a ridge ; dark brown, blackish on the narrow lateral angle ; width, 1.3 mm. Body segments distinct, creased several times in the incisures but not distinctly annulated, joint 13 divided. Cervical shield large, bisected, irregularly marked in black. Setæ distinct, from rather large, flat dark tubercles ; i. and ii. in trapezoidal form, iii. lateral, iv. and v. from a single substigmatal tubercle, vi. posteriorly, vii. above the base of the leg with three setæ, viii. single ; a small secondary tubercle with one little seta before the upper part of the spiracle. On the thorax normal, the setæ of i. and ii. united in pairs, iv. and v. united, vi. with one seta on joints 3 and 4. Thoracic feet well developed, armed with setæ and claw. Abdominal feet distinct, rather slender ; crotchets in a narrow ellipse, broken on the outer side, a single row, but doubly clawed, a slight hook on the outside as well as the more distinct one on the inside, both small.

Pupa.—Smooth, obtected, thickest through the second abdominal segment, slightly tapering each way, rounded, the head a little projecting. Anal end rounded, cremaster without projection, but with four rather long, stout, recurved hooks. Fifth and sixth abdominal segments moveable. Cases reaching to the end of the fourth segment ; eye covered by a single piece, separated below by the small, lanceolate labium ; maxillæ reaching about one-third the length of the cases, a small piece indistinctly segmented off at the base next to the labium ; first leg reaching two-thirds the length of the cases, enclosing a small elliptical piece of its basal part next to the maxilla ; second leg reaching to the tip of the cases, apparently touching the eye, but on careful focusing a small piece seems to be cut off at the base, which I take to represent the maxillary palpus ; antennæ not attaining the extremity of either the second legs or the wing cases ; third legs concealed. The spiracle on the first segment is concealed by a projection of the hind wing case which extends to segment 3. Light yellowish-brown, all the sutures narrowly and distinctly marked in dark brown. Smooth, shining, no distinct punctures or wrinkles of any kind. Length, 6.5 mm. ; width, 2.5 mm.

GRAPTA INTERROGATIONIS, ETC.

This insect is not by any means abundant in my neighbourhood, and for several years I only captured one or two of the pale variety *Fabricii*. About four or five years ago I saw a worn female of that variety depositing eggs upon a wild hop I had trained over the front of my house. I did not subsequently see any other female near the plant. I left the larvæ upon it until they were nearly full grown, when I collected about a dozen. I think they all hatched out safely, and the result was about one-third of the dark form *Umbrosa* to about two-thirds of the pale. The larvæ were all of a size, and pupated within a day or two of each other, so I think it reasonable to suppose they were all from the eggs I saw being deposited, and from one and the same mother. Never having before seen or taken the dark form, and not then having any book upon Canadian butterflies, I was rather surprised at the result. On looking over my notes for last year I do not see anything of special interest, except that I took a specimen of *Chionobas varuna* on 21st June, and the only one that I saw. The occurrence here of *Colias casonia* has already been noted.

Owing to a conversation I had some time ago with Dr. Fletcher, I paid particular attention to *Colias eurytheme* and its varieties. I did not detect a single instance of *Eriphyle* "in coitu," or even flirting with other than its own female, though there were many flying about of the early small yellow form of *Eurytheme* and also of *Keewaydin*, nor vice versa.

Neither did I notice any intercourse between *Eriphyle* and the large orange form *Amphidusa*, Scudder, but the males of each variety seemed to single out the corresponding females of that variety. I am aware I am venturing upon dangerous ground, but so far as I am able to judge from observation, I should certainly say that *Eriphyle* was a species distinct from *Eurytheme*. Unfortunately, I am unable to give the time required to the rearing of the large number of larvæ necessary to the determination of this question. What I want particularly to convey is that I have never noticed promiscuous intercourse between the different broods, if such they are, though they overlap each other, and are flying at the same time.

E. FIRMSTONE HEATH,

Cartwright, Manitoba.

"The Hermitage."

A RARE CATOCALA.

BY ARTHUR J. SNYDER, EVANSTON, ILL.

Early last July, while examining the collection of Prof. G. H. French at Carbondale, Ill., I saw for the first time a specimen of *Catocala Sappho*. Being especially interested in this genus of the Noctuids, I was somewhat surprised to see for the first time so striking a species, and felt sure that I would have no difficulty in recognizing the species should I ever see another example.

On July 6th, near Makanda, Ill., I began a search for *Catocala*. From the first hickory I "whipped," a *C. Sappho* started and lighted upon a white oak near by, but about fifteen feet from the ground. Through the aid of a fence rail placed against the tree, and by using the net, I easily captured my first *C. Sappho*, a perfect specimen, with the exception that a few scales were removed from the thorax. July 14th I was collecting four miles south of Makanda and captured two more *C. Sappho*, one in fair condition and one a badly worn example. Another in very poor condition was taken on July 13th. Two others were seen and captured, but allowed to escape through sheer anxiety not to injure them. It may be interesting to collectors to know that this rare moth is one of the slowest flyers in the genus, and is easily captured. It usually lights low, and is not easily frightened. On account of its light colour it is quite conspicuous. In all seven *C. Sappho* were seen in the vicinity of Makanda, Ill., in four days' collecting. It has been my pleasure to examine 78 or more of the species and varieties of North American *Catocala*, but I have seen nothing which approaches *C. Sappho* closely enough to be confusing even to an amateur.

THE NEW MEXICO SPECIES OF ANTHIDIUM.

BY T. D. A. COCKERELL, MESILLA, N. M.

The bee-genus *Anthidium* is not very well represented in New Mexico, the following being all yet observed.

(1.) *Anthidium larreae*, n. sp.—♀. Length about $12\frac{1}{2}$ mm., fairly stout, but the abdomen not subglobose; black, with yellow markings, those of the thorax recalling *Steniolia duplicata*. Head large, face nearly square, moderately shining, closely punctured, sides of vertex with punctures of unequal size; end of mandibles not developed into distinct teeth. Antennae short, black. Clypeus, broad triangle above, and lateral face marks, bright yellow; the last occupy all the space be-

tween clypeus and eyes, narrowing obliquely upwards so as to form nearly a right-angled triangle, continuing narrowly a little way along the orbital margin, then enlarging near the top of the eyes to a mark which points inwards towards the ocelli. Cheeks yellow, the yellow continuing across vertex as a narrow line. Mandibles yellow except ends. White pubescence rather sparse on face and cheeks; also on thorax, becoming dense on lower part of pleura. Tubercles, sides of thorax except a black patch on lower part of pleura, tegulae except a pair of fuscous spots (one much larger than the other), sides of mesothorax broadly, extending along the front some distance to an oblique truncation, two longitudinal stripes on mesothorax, and scutellum except median base, all bright yellow. Mesothorax and scutellum granular from a very close punctuation. Tubercles with a prominent keel. Hind margin of scutellum rounded, with a wide median emargination. Tegulae punctured. Wings subhyaline, strongly smoky in upper part of marginal cell, nervures black, second recurrent, going beyond tip of second submarginal cell. Posterior truncation of thorax shining black, with a pair of broad hammer-shaped yellow marks. Legs yellow; some black on anterior coxae above, and at base of anterior femora, also at base of middle tibiae and on basal two-thirds of hind tibiae; inner sides of all the legs largely ferruginous. Middle and hind tibiae, and basal joint of hind tarsi, all greatly broadened. Abdomen shining, microscopically tessellate, with large sparse punctures. Entire apical yellow bands on segments 1-5, broadest at the sides; apex yellow. Ventral scopa dense, white.

♂.—About the same size, abdomen more slender. Antennae longer, scape yellow in front. Yellow spot near tip of eyes much reduced, line on vertex broken and nearly obsolete. Stripes on dorsulum wanting. Tegulae with one large dark spot. Posterior truncation all black; upper part of pleura largely black. No spine on posterior coxa. First three bands of abdomen emarginate at sides. Rounded median hind border of sixth segment projecting. Apex rounded, broadly emarginate.

Hab.—Mesilla Valley, N.M., close to Agricultural College; a ♀ at flowers of *Larrea* (Creosote bush), May 6 [Ckl.]; also a ♀ taken May 18 by Mr. F. Garcia, and a ♂ taken some years ago by Prof. Townsend, both in the Mesilla Valley. Unfortunately the ♂ is reddened by cyanide. Mr. Fox kindly compared this species with Cresson's collection, and returned it marked "near *occidentale* and *sebratum*." It can be dis-

tinguished from these by the colour of the legs and the sides of the thorax.

(2.) *Anthidium occidentale*, Cress. — Described from specimens taken in New Mexico by Dr. Samuel Lewis in 1867. Not observed by me.

(3.) *Anthidium gilense*, n. sp. — ♀. Length hardly 10 mm.; robust, with long wings; black, with lemon-yellow markings. Head, mesothorax and scutellum with close, extremely large punctures, closest on front, largest on scutellum. Edge of mandibles with small, short, but quite distinct, teeth. Tubercles forming an oblong, sharp-edged lobe. Hind edge of scutellum straight, sharp, overshadowing metathorax. Second recurrent nervure going considerably beyond end of second submarginal cell. Abdomen of the subglobose type, shining, with large punctures, close enough to produce a subcancellate effect. Small spot on each side of clypeus; broad lateral face marks, extending only as far as level of antennæ, where abruptly truncate; continuous line on vertex, lateral thirds of front margin of mesothorax broadly, ends of tubercles, four spots on scutellum (the middle ones large and elongate), all yellow. Cheeks, pleura and shining posterior truncation, black. Tegulæ rufous, with an elongate yellow mark. Wings fuliginous, with a hyaline spot just beyond and partly in the third discoidal cell, and a much smaller one just beyond apex of second submarginal. Base subhyaline. Legs ferruginous, anterior femora blackened, a yellow stripe on anterior and middle tibiæ, a yellow spot at extreme base of hind tibiæ. First abdominal segment with an oblong yellow spot on each side. Second with a band, narrowly interrupted in middle, and produced into a short tooth on each side behind. Third to fifth segments with a pair of large quadrate yellow marks, and a small spot on each extreme side. Apical segment black. Ventral scopa white. Pubescence of legs, thorax and head white, but very little of it; a small but conspicuous patch behind the wings.

Hab.—West Fork of Gila River, N. M., July 17, one specimen [C. H. T. Townsend]. Of the N. M. species it most resembles *pudicum*, but it is quite distinct.

(4.) *Anthidium pudicum*, Cress. — Five at Santa Fé, N. M.: two on flowers of *Grindelia squarrosa*, Aug. 2 and 3, in company with *Heriades*, *Melissodes*, *Megachile* and *Podalirius*; two resting in hole in adobe wall, Aug. 2. A ♀ was submitted to Mr. Fox, and returned marked *pudicum*;

the N. M. form is perhaps a distinct race, as all have the markings yellow, whereas the typical form from Nevada has them white.

(5.) *Anthidium emarginatum*, Say.—Taken in 1867 by Dr. Lewis, and described by Cresson as *atrifrons*.

(6.) *Anthidium interruptum*, Say.—Las Cruces, N. M., and Chaves, N. M.: four, all taken by Prof. Townsend. Determined by Mr. Fox.

(7.) *Anthidium maculifrons*, Smith.—Taken in 1867 by Dr. Lewis. One taken by Prof. Townsend in Soledad Canon, Organ Mts., Aug. 15, 1896, on plant No. 40.

(8.) *Anthidium maculosum*, Cress.—Tuerto Mtn., near Santa Fé, 8,025 feet, Aug. 7, on flowers of *Senecio*. Besides the difference in the markings, this differs from the last in the abdominal punctation.

There is in New Mexico another bee which might easily be taken for a small *Anthidium*, namely *Stelis costalis*, Cresson. This is a very variable species, both as to size and colour. It was taken by Prof. Townsend on the West Fork of the Gila R., July 16, and by me at Santa Fé, on flowers of *Rudbeckia laciniata*, July 19. It is the only *Stelis* yet observed in New Mexico.

A NEW ATTID SPIDER.

BY T. D. A. COCKERELL, MESILLA, N. M.

Leius Peckhamæ, n. sp.

Length not quite 5 mm. Cephalothorax above brilliant peacock green, slightly intermixed with brassy in front; white hairs above the row of eyes forming a weak band, also narrowly encircling the eyes; an irregular patch of white hairs beneath the hindmost eyes; lateral (inferior) margins of cephalothorax with a broad, well-defined white band. Legs black with white hairs, the hairs so arranged as to divide the legs into alternate sections of black and white; the tibiæ black at base and middle, the tarsi narrowly black at base. Palpi covered with white hairs. Mandibles black. Abdomen above brilliant metallic magenta, with the base yellowish green; the sides and the under surface white, minutely speckled with black.

Legs approximately 4 (31) 2. Quadrangle of eyes occupying less than half of cephalothorax. First row of eyes a little curved; middle eyes almost touching, lateral hardly half their diameter, and separated from them by a very short interval. Posterior eyes of the same size as anterior lateral, further from each other than from the lateral borders of the cephalothorax. Sternum with white hairs.

In alcohol the abdomen is not so brilliant, and most of those parts of the legs covered by white hairs appear brown. The legs have a little metallic colour.

First legs $2\frac{3}{4}$ mm. long, second $2\frac{1}{2}$, third 3, fourth 4. Width of abdomen, $1\frac{1}{3}$ mm. Length of cephalothorax, 2 mm.

Hab.—In the course of some investigations of the codling moth, this beautiful little spider was found not rarely hibernating under the bark of apple trees in Mesilla, N. M. Mr. G. W. Peckham, to whom specimens were sent, confirms it as new. *I. Peckhamæ* is respectfully dedicated to Mrs. Elizabeth G. Peckham, who, in conjunction with her husband, has done such admirable work on the Attid spiders. The present description will serve to fix the name; Mr. and Mrs. Peckham will no doubt figure the palpus, etc., when they come to revise the group.

SPHINX LUSCITOSA, CLEM.

On the morning of the 9th of June, 1897, Mr. Bice took from an electric-light pole in London a fine male specimen of that rare moth, *Sphinx luscitiosa*, Clem.

All the writers upon the Sphingidæ that I have consulted are agreed in pronouncing it rare. Mr. Grote says: "This is probably our rarest hawk moth of these kinds, proper to the Middle States." Dr. J. B. Smith states that "the species is very rare." This is the first report of its being taken in this section of the Province that I am aware of.

Prof. Fernald, upon information received from the Rev. G. D. Hulst, says that it had been bred near Newark, N. J., on willow. Dr. Smith says: "The species has been frequently raised in the vicinity of New York on willow." But whether willow is its natural food plant, or that the larvæ merely feed upon willow in preference to other plants offered to them, is not stated. If willow proves to be its natural food plant, it does seem decidedly strange that, with willow everywhere so plentiful, *luscitiosa* should yet remain so very rare, and would lead one to surmise that there must be some special influence at work that is the cause of it. Up to the time of Dr. Smith's writing (1888) no description of the larvæ was obtainable.

J. ALSTON MOFFAT.

London, Ont.

In my last communication *Agrotis catherina* is printed as a separate species, whereas it ought to have appeared as a synonym of *Semiophora tenebrifera*, Walk.

J. A. M.

Mailed September 2nd, 1897.



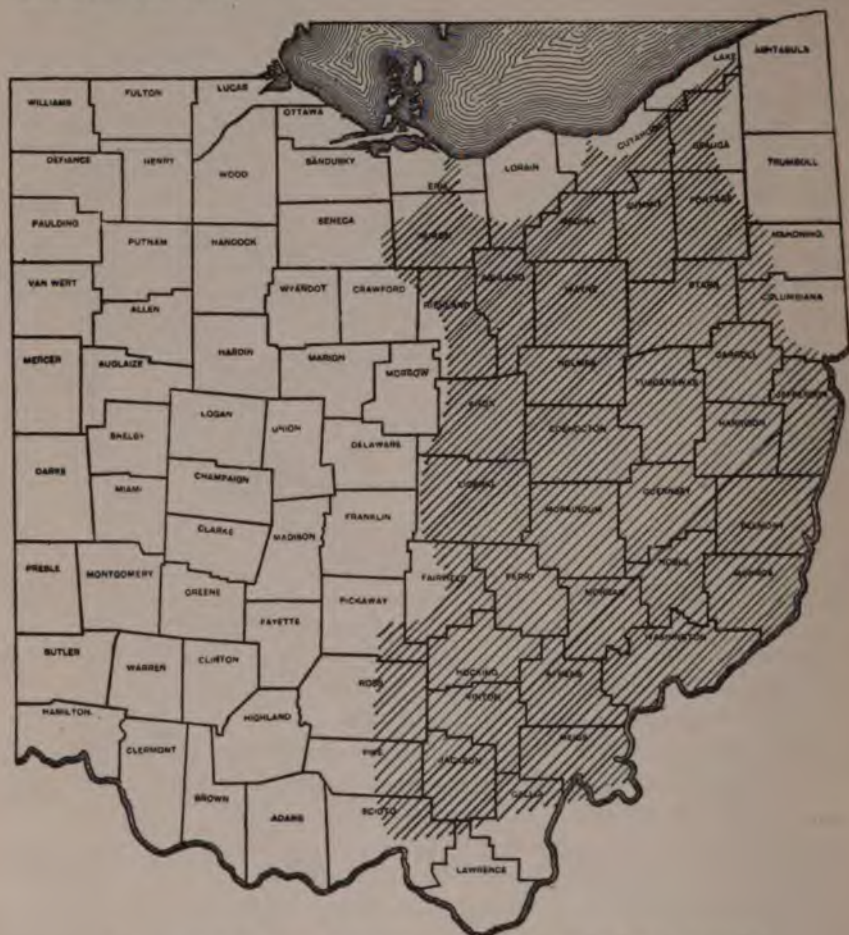


FIG. 1.—MAP SHOWING DISTRIBUTION OF BROOD XV, CICADA SEPTENDECIM, IN OHIO, IN 1897.



FIG. 2.



FIG. 3.

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No. 10.

BROOD XV. OF CICADA SEPTENDECIM IN OHIO.*

BY F. M. WEBSTER, WOOSTER, OHIO.

Having had the opportunity of working out the distribution of broods V., VIII. and XXII. in Indiana, brood XV. in Ohio possessed a peculiar interest for me, as in studying it I was able to profit considerably by my acquaintance with the others. I perhaps ought to say a word in regard to the three other broods mentioned, as one of them (XXII.) is treated of at considerable length in the Report of the Entomologist of the United States Department of Agriculture for the year 1885, and it was while connected with the Department as one of its special agents that these three broods were studied. Brood XXII. covered the entire State of Indiana, except a narrow strip of land around the lower end of Lake Michigan, from ten or fifteen to twenty miles wide, which area was exactly covered by brood V. in 1888. The coloured map which accompanies the report mentioned is defective in that the two points extending southward, not indicated as being covered by this brood, were, as was afterwards learned, within the area covered by brood XXII. and not covered by brood V., the line of separation being about ten miles east of the lake on the line between Michigan and Indiana, and running nearly south-west to the east line of Porter county, the course then trending slightly more to the westward to the Illinois line; in no case, I believe, extending to the Kankakee River, thus making the line of separation much more uniform than the one indicated on the map cited above, on which the dividing line is quite irregular.

Brood VIII. occurred in southern Indiana, becoming excessively abundant only in Harrison county, but covering the area south of a line drawn from Vincennes to Greencastle, Franklin, and eastward to northern Dearborn county. Singularly enough, a single female was brought me at Lafayette, fully 60 miles north of Greencastle, which probably marked the northernmost point where the species could be said to occur in any numbers.

* Read before Section "F," Zoology, of A. A. A. S., at Detroit, Michigan, August 10th, 1897.

One of the most striking peculiarities of brood XV. in Ohio was its exceedingly uneven distribution within the boundaries of its range. On driving over the country during the midst of the season of greatest activity, one would suddenly find himself in the midst of a din that was almost deafening, and the woods would be browned with discoloured twigs, while within a mile he would find himself in the midst of a silence that from contrast was almost oppressive, while there was not a discoloured twig to be observed. This lack of uniformity in distribution rendered the work of locating the exact boundaries of the brood quite difficult in some cases, as one must often go miles beyond it in order to be quite sure that he had found the last outlying colony. But in other cases the effect was the reverse. In going southward from Painesville, over the P. & W. Ry., which cuts through what is locally known as "Johnnycake Ridge," not a note was to be heard, and not a discoloured twig was to be seen on tree or shrub, but on leaving the cut, which is by no means a long one, the combined notes of the thousands of Cicadas were clearly heard above the noise of the train, while scarcely a tree or bush escaped the attack of the females, and some of them would not have been more thoroughly browned if a fire had broken out among them. In the city of Lancaster they were reported as abundant in the east part of the town, while there were scarcely any in the western portion, and it turns out that the dividing line between this brood and brood XXII. is practically indicated, as nearly the same conditions were observed to occur seventeen years ago.

The brood is certainly becoming weakened each time it reappears, and the boundaries of its occurrence did not in many cases extend as far as they did when it last appeared, sometimes the difference amounting to several miles. Near Painesville it occurred some three miles nearer to the lake shore in 1846 and in 1863 than it did in 1880 or the present year. It was at Bellevue in 1880, but did not extend so far west this year, and the same is true of its occurrence northward toward the lake. Where it was quite abundant in 1880 it did not appear at all this year. It was reported by two observing correspondents as having been present in limited numbers in Ashtabula county in 1863 and again in 1880, but no trace of it could be found this year. In short, it seems to be slowly but surely dying out, and will in time be known only in history. Brood XXII. is a much stronger one—at least it was in Indiana—but I question if in time the Periodical Cicada is not wholly exterminated in Ohio, and there seems no reason why this should not be true of many other States. The gradual

extinction of the native forests will have much to do with this, but their natural enemies, especially the English sparrow, are having a much more fatal effect.

In 1885, in Indiana, I first saw the English sparrow come in contact with the Periodical Cicada. In the city of Lafayette the insect appeared in considerable abundance, and for a few days there was no lack of the well-known notes of the male, but suddenly there was a decided falling off, and by listening carefully one would occasionally detect a note suddenly cut short at its very height, and close watching revealed the fact that the sparrows had come to recognize the note as well as the form of the musician, and as a result, within a few days, though there were myriads in the woods, not a single one could be found in the city, the abundance of wings upon the pavements showing too well the tragedies that had been enacted there.

With these observations in mind, I watched for the coming of brood XV. in Ohio with considerable interest. On the morning of May 28th a full complement of wings was found on the pavement under a shade tree, and during the following days these detached wings became more numerous, but not a Cicada note was heard. Going out into the residential portion of the town at dusk, I would observe pupæ emerging from the lawns and making their way to the shade trees across the pavement bordering the street, but not one could be found the next morning, though the pavement was littered with detached wings. While back in the woods a half mile away there were great numbers of them, creating almost a continual din during the day; in town during the whole season I only saw a single living adult and heard not a single note.

In southern Ohio I one day watched the Cicadas attempting to make their way across a clearing, from a bit of woods to an orchard situated some distance away and below the woods, which was on a bluff. The afternoon sun shone directly across the clearing, thus enabling me to witness every attempt of the insects to fly from woods to orchard. The sparrows were in the latter, and the moment a Cicada appeared its silvery wings would glisten in the sunlight for a few moments, when a sparrow or sometimes two of them would make a dash for it, and if the prey was missed, as was sometimes the case, the bird would turn suddenly and try again, generally with better success. I watched the actions of birds and insects for a couple of hours, but did not see a single Cicada cross the clearing. Though there were numbers of *Pieris rapæ* and some other

butterflies winging their way about over the clearing, I did not see a single mistake made on the part of the sparrows. They had become adept enough in two or three weeks to be able to distinguish a Cicada with an unerringness that was simply surprising, when we come to consider that none of their immediate progenitors could have seen or tasted a Cicada.

Other bird enemies appear to be very few, and these not over-voracious. Mr. J. J. Harrison, of Painesville, Ohio, saw the crow black-bird feeding upon them in 1846, while the labourers on the Station Farm at Wooster claim to have observed the robin to attack them. A species of *Tachina* fly seemed to play havoc with the latter portion of the brood, and either owing to this or some other reason, they suddenly disappeared between June 24th and June 28th. On the former date, in the Experiment Station orchard, they were excessively abundant, while on the latter there was not a living Cicada to be found there, while the stench arising from the dead bodies was quite apparent to one walking through the orchard.

As usual, the injury inflicted was slight, except in cases of very young orchards, and I saw in one case a, to me at least, unique form of attack. This is shown in the plate (fig. 3), and instead of the regular, quite conspicuous punctures (fig. 2) made by the female for a nidus, she appeared to have simply thrust her ovipositor into the wood, and with no further external wound deposited her ova.

The distribution of the brood in Ohio is illustrated in the accompanying map, plate 8, fig. 1.

In its distribution, rivers do not appear to have had much influence, as it will be noticed that in southern Meigs county a small area outlined by a bend in the Ohio River is only partly covered; in one township, Letart, the Cicada not being found at all; while a corresponding point of West Virginia comes within the range of distribution, even though lying across the river. From this point the dividing line trends slightly to the south-west, passing north of Gallipolis, and extending to the Scioto River, at a point a few miles above its mouth, but not extending beyond this to the westward. North the line follows the east bank of the river until the bend between Waverly and Chillicothe is reached, when it crosses the river and holds to its nearly northerly course to near Circleville. Here the line makes a sharp curve to the north-east to the city of Lancaster, in Fairfield county, but trends north-west to the eastern line of Franklin county, thence almost northward along the east line of

Delaware and Morrow counties to a point in Richland county about a mile west of the village of Ontario, when it changes again to the north-west, crossing the north-east corner of Crawford and the south-east corner of Seneca, then a little east of north to a point near Lake Erie, a mile and a half south-west of the city of Huron, Erie county. This area in Erie county is, however, but little more than a peninsula-like extension, and will probably not appear again. Near the south line of Erie county the line of demarcation makes a broad sweep to the south-east, thus leaving both the north-west and north-east corners of Huron county unoccupied, as well as all of Lorain county, except the southern portion and south-eastern border, and the western end of Cuyahoga county. Just west of Cleveland another peninsular extension occurs lakeward, where the Cicada appeared for a few days at first, but suddenly disappeared before the brood reached its maximum in numbers in the adjacent counties. This also will hardly appear again. From this point to near the eastern end of Lake county the insect keeps well back from the lake, though it formerly occupied ground much nearer to the shore. The eastern terminus also comprises but little more than a promontory, as the course here changes broadly to the south-west and then to the south east, leaving a considerable portion of eastern Geauga county and the north-east corner of Portage county unoccupied. The dividing line here only touches the south-west corner of Trumbull county and includes the western end of Mahoning and Columbiana counties and the southern border of the latter, the line passing into West Virginia or Pennsylvania, near East Liverpool, Ohio, where this year a very few Cicadas appeared, and where brood XV. overlaps brood XX.

I shall be obliged to confess that when I began to map out the area covered by brood XV. it was with more enthusiasm than I could command when I finished the survey. The map indicates, with a good degree of accuracy, the area over which the brood occurred in 1897, but that it will as accurately show the area covered by the brood in 1914, I have no expectations. The continued destruction of forests and the inroads made upon the brood by its natural enemies will result in great changes, not only in the outline of the area of habitation, but this will be composed of more and more isolated and continually decreasing "Cicada Islands," as I might term them, until the well-known notes of the male will have ceased forever, and the voiceless female will have followed her spouse into the shades of oblivion.

THE NINTH ANNUAL MEETING OF THE ASSOCIATION OF
ECONOMIC ENTOMOLOGISTS, DETROIT, MICH.,
AUGUST 12TH AND 13TH, 1897.

The Association met in Room 212, Central High School Building, immediately following the adjournment of Section F. Thirteen active members were present, together with many visitors, prominent among the latter being Dr. C. A. Dohrn, Prof. E. B. Poulton, Dr. C. P. Hart, Dr. C. S. Minot, and Dr. C. W. Stiles. The Association was called to order by the President, and in the absence of Secretary Marlatt a secretary *pro tem.* was chosen. The address of the retiring president, Prof. F. M. Webster, treated of "The Present and Future of Applied Economic Entomology in the United States," and contained, among other very interesting features, an admirable tribute to the value of the systematist and a somewhat caustic criticism of the "species maker," helpful suggestions for the experiment station worker, and a very frank discussion of the unfortunate results which attend the attempts sometimes made to combine politics and science. The following were elected to active membership:

- G. B. King, Lawrence, Mass.
- Gerald McCarthy, Raleigh, N. C.
- E. P. Felt, Albany, N. Y.
- A. F. Burgess, Malden, Mass.
- W. B. Barrows, Agricultural College, Mich.
- R. H. Pettit, Agricultural College, Mich.
- W. S. Blatchley, Indianapolis, Ind.

The following were elected foreign members:

Claude Fuller and Richard Helm, both of Perth, West Australia.

These additions increase the numbers of this Association to ninety-three active and thirty-one foreign members.

Following the election of members, Dr. L. O. Howard presented "Additional Notes on the Parasites of *Orgyia leucostigma*." This paper gave the results of the rearing of a large number of primary and secondary parasites, and contained a general discussion of the different phases of insect parasitisms.

"Temperature Effects as Affecting Received Ideas Concerning the Hibernation of Insects," by the same author, showed that a sudden alternation between low and high temperatures was remarkably fatal to the larvæ of clothes moths, Buffalo carpet beetles, and other insects of allied habits.

An abstract of "Notes on Certain Species of Coleoptera that Attack Useful Plants," by F. H. Chittenden, was read by the secretary *pro tem*. These notes treated chiefly of the food plants and habits of certain Chrysomelids.

A letter from Miss E. A. Ormerod called particular attention to the fact that the house sparrow had been very abundant and very obnoxious in certain parts of England, and it seemed probable that some legislation or public measures would need to be adopted to control this bird. The arrival from Tripoli of a cargo of wheat badly infested by the Angoumois moth was recorded and reference made to the occurrence in injurious numbers of *Xyleborus dispar* at Teddington.

Prof. P. H. Rolfs presented notes on "A Fungus Disease of the San José Scale." This disease seems to be confined to the southern part of the United States, but is very helpful to fruit growers there. The scale has been almost eradicated from several orchards by this disease. Laboratory and field experiments now in progress promise helpful results, but it does not seem probable that this disease will be of value in the northern part of the United States, since warmth and moisture are necessary for its development.

Mr. Barrows made a brief statement concerning the distribution of the San José scale in Michigan. The insect had been found scattered throughout the southern counties of the State, where it had probably existed for eight years. In discussing this paper, Mr. Craig spoke of the occurrence of the scale in southern Ontario, where there were at least seven infested localities.

A paper from Prof. C. P. Gillette, on "Insects Taken at Light and Sugar," evoked considerable discussion, and was followed by "A Study of the Possible Origin and Distribution of the Chinch Bug," by Prof. F. M. Webster. The author advanced the idea that this insect had originated in the southern part of the United States, and spread by two diverging streams up the Mississippi Valley and along the eastern Atlantic coast. In the former region the long-winged form predominated, while the coast form was short-winged. In the discussion following this paper the general opinion seemed to be that the length of the wings depended upon environment rather than heredity. Mr. C. W. Mally recorded the capture at Ohio of a specimen having one long and one short wing, thus throwing additional light upon the relationship between the two forms.

"Notes on the Common House Fly," by Mr. Howard, gave the

negative results of a series of experiments with lime, land plaster, etc., used to destroy the larvæ of the house fly. He emphasized the necessity of greater cleanliness in the management of horse stables.

A paper from Mr. Gillette, on "Vernacular Names of Insects," was read and referred to a committee consisting of Messrs. Howard, Fernald and Lintner. A communication from C. P. Lounsbury, giving very interesting notes on "Cape of Good Hope Insects," particularly the locusts of that region, was then read.

Mr. H. G. Hubbard presented an account of the "Insect Fauna of the Giant Cactus," recording the capture of a large number of insects on this plant and giving notes on their habits.

Mr. Howard described "A Valuable Coccid" lately discovered in Arizona and New Mexico, from which, by suitable treatment, a good grade of white wax could be obtained. The refuse from this operation is of the nature and consistence of India-rubber, and may be of commercial value.

"Notes on Insects of the Year," by Messrs. Webster and Mally, recording interesting experiences with several of the common insect pests. The negative results of a series of experiments with kainit, against the insects attacking the roots of the grape, caused considerable discussion, and the need for further experimentation along this line was pointed out.

A paper by A. H. Kirkland, on "Preparation and Use of Arsenate of Lead," detailed a method of preparing this insecticide at a cost of about seven cents per pound. Work against the Gypsy moth was mentioned, and the condition of the infested region was reported as generally better than that of last year. This undertaking, however, is still handicapped by insufficient financial support.

"A Malodorous Carabid," by Mr. Barrows, gave extensive notes on the annoyance and discomfort caused by the almost unbearable odour of this insect, *Nomius pygmaeus*.

At the final adjournment of the session it was voted to hold the next meeting at Boston, Mass., August 19th and 20th.

Several resolutions were passed, among which were (1) a resolution requesting the publication of the proceedings as a bulletin of the Division of Entomology, U. S. Dept. of Agriculture, and (2) expressing familiarity with the efforts of the State of Massachusetts to exterminate the Gypsy moth, and commending the results already accomplished.

The election of officers resulted as follows: President, Herbert Osborn, Ames, Iowa; 1st Vice-President, Lawrence Bruner, Lincoln, Neb.; 2nd Vice-President, C. P. Gillette, Ft. Collins, Colo.; Secretary and Treasurer, C. L. Marlatt, Washington, D. C.

A. H. KIRKLAND, Secretary *pro tem*.

A LIST OF THE COLEOPTERA OF THE SOUTHERN
CALIFORNIA ISLANDS, WITH NOTES AND
DESCRIPTIONS OF NEW SPECIES.

BY H. C. FALL, PASADENA, CAL.

Early in May of the present year (1897) the Pasadena Science Club sent three of its members on a month's general collecting trip to certain of the Santa Barbara islands lying off the coast of Southern California. While none of the members of the expedition were, strictly speaking, entomologists, a considerable experience in collecting, combined with some preliminary instruction, enabled them to devote intelligently a portion of their time to the collection of insects, more especially of the Coleoptera.

The islands visited were in the order named, Santa Barbara, San Nicolas, and San Clemente, distant respectively forty, sixty, and fifty miles from the nearest point on the mainland. Inasmuch as the entire material in Coleoptera, consisting of forty-six species and upward of one thousand specimens, has been submitted to me for study, it seems a fitting occasion for presenting as complete a list as possible of the coleopterological fauna of the entire group of islands, from Santa Cruz to Guadalupe.

To Eastern collectors it may seem a matter for wonderment that so interesting a field should so long remain, entomologically speaking, practically unexplored; yet it must be remembered that entomologists are here exceedingly few and far between, and the islands are, with the exception, for the past few years, of Catalina, nearly or quite uninhabited and not conveniently accessible. Every now and then, to be sure, an Eastern man appears with bottles and net, but to him the whole vast region is a terra incognita. Mountain and desert and valley offer opportunities without number; he takes the goods the gods provide and troubles not himself about possibilities in lands hull down in the Pacific. And so it happens that the few beetles recorded from the islands we owe to the kindness of one or another of the botanists or ornithologists who have at long intervals found their way there.

It is believed by those best competent to judge that these islands are the summits of a submerged mountain range forming a part of the mainland, or at least connected with it as a peninsula, until after the beginning of the Quaternary Period, when it was separated and broken

up into islands by subsidence. The close similarity between the flora and fauna of Guadalupe and California has several times been cited in support of this view and seems in itself almost conclusive.

As far as I can learn from the literature at hand, the following fifteen species of Coleoptera are all that were described or reported from the islands up to 1875 :

From Santa Cruz—*Asaphes tumescens*, *Malthodes laticollis*, *Phobetus comatus*, *Ernobius debilis*, *Helops Bachei*; from Santa Catalina—*Pristoscelis punctipennis* and *P. pedalis*; from San Clemente—*Coniontis lata*, *Eusattus robustus*, *Eulabis grossa*, *Amara insularis*; from Santa Barbara—*Eleodes scabripennis*, *Cibdelis Bachei* and *Meloe barbara*. *Pristoscelis ænescens* is said to be "from the islands off Santa Barbara," and it is more than probable that the same reading should be applied to the three preceding species. Nearly if not all the above named species were taken either by C. M. Bache or Dr. J. G. Cooper and given to Dr. Leconte, by whom they were described (1861-1866), with the exception of *Amara insularis*, which was described by Dr. Horn in 1875.

In 1875, Dr. Edward Palmer brought from the Guadalupe Islands the following twenty-three species, which were enumerated by Dr. Horn, Trans. Am. Ent. Soc., V., 1876 :

| | |
|-------------------------------------|---------------------------------------|
| <i>Calosoma semilæve</i> , Lec. | <i>Trogosita virescens</i> , Fab. |
| " <i>Palmeri</i> , Horn. | <i>Saprinus lugens</i> , Er. |
| <i>Bembidium striola</i> , Lec. | <i>Cardiophorus luridipes</i> , Cand. |
| <i>Amara insignis</i> , Dej. | <i>Pristoscelis pedalis</i> , Lec. |
| " <i>californica</i> , Dej. | <i>Necrobia rufipes</i> , Fab. |
| <i>Platynus maculicollis</i> , Dej. | <i>Cænonycha socialis</i> , Horn. |
| <i>Calathus obscurus</i> , Lec. | <i>Atimia dorsalis</i> , Lec. |
| <i>Tachycellus nebulosus</i> , Lec. | <i>Cœlotaxis muricata</i> , Horn. |
| <i>Anisodactylus piceus</i> , Mén. | " <i>punctata</i> , Horn. |
| <i>Anisotarsus flebilis</i> , Lec. | <i>Conibius seriatus</i> , Lec. |
| <i>Necrophorus nigrita</i> , Mann. | <i>Helops Bachei</i> , Lec., var. |
| <i>Dermestes vulpinus</i> , Fab. | |

In an appendix to the annual report of the Chief of Engineers for 1876, Dr. Leconte gives a list of species taken in So. California the previous year by the expedition for geographical survey under Lieut. Geo. M. Wheeler, among which are the following seventeen species from the island of Santa Cruz :

| | |
|-----------------------------------|---------------------------------|
| Omophron dentatum, Lec. | Tropisternus californicus, Lec. |
| Bembidium transversale, Dej. | Hydrocharis glaucus, Lec. |
| Calathus ruficollis, Dej., var. | Carpophilus pallipennis, Say. |
| Platynus brunneomarginatus, Mann. | Polycaon Stoutii, Lec. |
| Pterostichus lätulus, Dej. | Phlæodes diabolicus, Lec. |
| Amara californica, Dej. | Coniontis viatica, Esch. |
| Anisodactylus consobrinus, Lec. | " subpubescens, Lec. |
| Hippodamia vittigera, Mann. | Cratidus osculans, Lec. |
| Dermestes talpinus, Mann. | |

In 1892 — Zoe, Vol. III., p. 262 — Mr. F. A. Seavey gives a short list of insects taken by him on Santa Catalina in August of that year. This list includes fourteen species of Coleoptera, of which three — *Balaninus obtusus*, *Pristoscelis quadricollis* and *Anthonomus canus* — are quite surely incorrectly determined and will not be included in the following list.

During parts of July and August, 1892 and 1894, about four weeks in the aggregate was spent by the writer on Catalina. The island was then very dry and collecting was rather unremunerative. Nevertheless upward of one hundred species were added to previous records.

To these must be added more than thirty species out of seventy-five taken by Dr. Gustav Eisen on Santa Rosa during May of the present year; a few taken on Catalina by Dr. A. Fenyès, of Pasadena, at about the same time; and finally, about half of the forty-six species collected by the expedition alluded to at the beginning of this article. The material collected by them is of especial interest inasmuch as it is probable that no insects have before been brought from either Santa Barbara or San Nicolas—the most remote of all the islands of the Santa Barbara group—and but four beetles from San Clemente. The catch of Dr. Eisen on Santa Rosa is of nearly equal interest for similar reasons. The following abbreviations are used in the subjoined list:

| | |
|---------------------|-----------------|
| B. Santa Barbara. | G. Guadalupe. |
| Ca. Santa Catalina. | N. San Nicolas. |
| Cl. San Clemente. | R. Santa Rosa. |
| Cz. Santa Cruz. | |

* Species hitherto recorded from same island.

† Species not known to occur on mainland.

- Cicindela oregona*, Lec. R.
Omophron dentatum, Lec. Cz.* R.
Cychrus mimus, Horn. Ca.
Calosoma semilæve, Lec. G.* R.
† " *Palmeri*, Horn. G.*
Dyschirius gibbipennis, Lec. R.
Schizogenius depressus, Lec. Ca.
Bembidium transversale, Dej. Cz.
* R.
Bembidium striola, Lec. Ca. G.*
" *platynoides*, Haywd. R.
" *indistinctum*, Dej. R.
" *ephippiger*, Lec. R.
" *iridescens*, Lec. Ca.
Tachys vittiger, Lec. Ca.
" sp. nov.? Cl.
Pterostichus Isabellæ, Lec. Ca. Cl.
" *Menetriesii*, Mots. R.
" *lætulus*, Lec. Cz.* R.
" sp. indet. R.
Amara insignis, Dej. G.* Ca.* R.
† " *insularis*, Horn. Cl.* N. B.
" *californica*, Dej. G.* Cz.* R.
Calathus ruficollis, Dej. Ca. Cz.*
" *obscurus*, Lec. G.* R.?
Platynus brunneomarginatus, Mann.
Ca.* Cz.* R.
Platynus funebris, Lec. Ca.
" *maculicollis*, Dej. G.* R.
" *variolatus*, Lec. Ca.
Brachynus carinulatus, Mots.? Ca.
Chlœnius obsoletus, Lec. Ca.
Agonoderus lineola, Fab. R.
Stenolophus limbalis, Lec. Ca.
Bradycellus rupestris, Say. Ca.
" *californicus*, Lec. R.
Tachycellus nebulosus, Lec. G.*
" *nitidus*, Dej. Ca. R.
Anisodactylus dilatatus, Dej. R.
" *piceus*, Mén. G.* R.
Anisodactylus consobrinus, Lec.
Ca. Cz.* R.
Anisodactylus californicus, Dej.
Ca. R.
Anisotarsus flebilis, Lec. G.*
Deronectes striatellus, Lec. R.
Hydroporus vilis, Lec. Ca. R.
Agabinus glabrellus, Mots. Ca.
Agabus lugens, Lec. R.
Ochthebius discretus, Lec. Ca.
Tropisternus ellipticus, Lec. Ca.
Tropisternus californicus, Lec. Ca.
* Cz.*
Hydrocharis glaucus, Lec. Cz.* R.
Chætarthria nigrella, Lec. Ca.
Laccophilus ellipticus, Lec. Ca. R.
Cymbiodyta dorsalis, Mots. Ca. R.
Cercyon luniger, Mann. Ca.
Necrophorus guttula, Mots. Cl.
Necrophorus nigritus, Mann. G.*
Cl. R.
Silpha ramosa, Say. R.
" *lapponica*, Hbst. R.
Aleochara bimaculata, Grav. Ca. Cl.
" *sulcicollis*, Mann. R.
Polistoma arenaria, Csy. Ca. B.
Heterothops californicus, Lec. Ca.
Creophilus villosus, Grav. Ca. Cl.
Hadrotes crassus, Mann. R.
Philonthus longicornis, Steph. Ca.
" *nigritulus*, Grav. Ca.
" *Lecontei*, Horn. R.
Actobius puncticeps, Horn. Ca.
Cafius canescens, Mann. N.
" *lithocharinus*, Lec. R.
" *luteipennis*, Horn. R.

- Cafius sulcicollis*, Lec. R.
 " *opacus*, Lec. Ca.
Lathrobium jacobinum, Lec. R.
Caloderma reductum, Csy. Ca.
 " *mobile*, Csy. Ca.
 " *sp.* Ca.
Tachyporus californicus, Horn. Ca. R.
Pseudopsis, *sp.* Ca.
Haploderus flavipennis, Csy. Ca.
Apocellus analis, Lec. Ca.
Hippodamia vittigera, Mann. Cz.*
Hippodamia ambigua, Lec. Ca. *
 Cl. R.
Hippodamia convergens, Guér. Ca.*
Coccinella, *v. californica*, Mann. Ca. Cl. N. R.
Cycloneda oculata, Fab. Ca.
 " *sanguinea*, Linn. Ca. *
Psyllobora, *v. tædata*, Lec. Ca.*
Chilocorus bivulnerus, Muls. Ca.*
Cryptognatha catalinæ, Horn. Ca. Cl.
Hyperaspis lateralis, Muls. Ca.*
Scymnus guttulatus, Lec. Ca.
 " *nebulosus*, Lec. Ca.
 " *cervicalis*, Muls. Ca.
 " *marginicollis*, Mann. Ca.
 " *ardelio*, Horn. Ca. Cl.
Cephaloscymnus occidentalis, Horn. Ca.
Cephaloscymnus ornatus, Horn. Ca.
Rhizobius lophanthæ, Blaisd. Cl.
Aphorista morosa, Lec. R.
Cryptophagus, *sp.* Ca. Cl.
Atomaria, *sp.* R.
Dermestes marmoratus, Say. Ca. Cl. N. R.
Dermestes Mannerheimii, Lec. Cl. N. B. R.
Dermestes talpinus, Mann. Cz.*
 " *tristis*, n., *sp.* R.
 " *vulpinus*, Fab. G.*
Trogoderma sternale, Jayne. Ca.
Hololepta vicina, Lec. Ca.
Saprinus interstitialis, Lec. Ca.
 " *lugens*, Er. Cl. N. B. G. * R.
 " *fimbriatus*, Lec. Ca.
 " *vitiosus*, Lec. Ca.*
 " *Jubricus*, Lec. Ca. Cl. R.
 " *sp. near laridus*. Ca.
Cercus sericans, Lec. Ca.
Carpophilus pallipennis, Say. Ca. * Cz. * Cl.
Coninomus fulvipennis, Mann. Ca.
Corticaria distinguenda, Com. Ca. Cl.
Corticaria, *sp.* Ca.
Trogosita virescens, Fab. G. *
Dryops productus, Lec. Ca.
Cardiophorus luridipes, Cand. G.*
Melanotus variolatus, Lec. Ca.
Asaphes tumescens, Lec. Cz.*
Acmaodera connexa, Lec. R.
Telephorus notatus, Mann., var. Ca.
Malthodes laticollis, Lec. Cz.*
Collops cribrosus, Lec. R.
Endeodes abdominalis, Lec. Ca.
 † " *sp.* Ca.
 " *sp.* R.
Malachius, *sp. nov.*? R.
 † *Attalus subfasciatus*, n. *sp.* Cl.
Pristoscelis ænescens, Lec. B.* R.
 " *punctipennis*, Lec. Ca.*
Pristoscelis pedalis, Lec. Ca.*
 G. * Cl.

- Listrus*, sp. Cl. R.
 † *Dasytes*, sp. nov. Ca.
 † " sp. nov. Cl.
Eschatocrepis constrictus, Lec. Ca.
Cymatodera ovipennis, Lec. Ca.
 " *angustata*, Spin. R.
Necrobis rufipes, Fab. G. * Ca.
 Cl. R.
Necrobis ruficollis, Fab. Cl.
 † *Ernobius debilis*, Lec. Cz. *
 † *Oligomerus*? n. sp. Ca.
Trypomyia tenuilineata, Horn. Ca.
Hemiptychus obsoletus, Lec.? Ca.
Eucratocerus Hornii, Lec. Ca.
Sinoxylon declive, Lec. N.
Polycaon Stoutii, Lec. Cz. *
Cis, sp. Ca.
Cænonychia rotundata, Lec. Ca.
 † " *socialis*, Horn. G. *
Phobetus comatus, Lec. Ca. Cz. * R.
Cyclocephala villosa, Burm. Ca.
Phymatodes juglandis, Leng? R.
Oeme gracilis, Lec. Ca.
Romaleum simplicicollis, Hald. Ca.
Megobrium Edwardsii, Lec. R. *
Xylotrechus oblitteratus, Lec. Ca.
Atimia dorsalis, Lec. G. *
Ipochus fasciatus, Lec. Ca.
Pachybrachys, sp. Ca.
 " sp. Ca.
Diachus auratus, Fab. Ca. Cl. R.
 † *Colaspidea subvittata*, n. sp. Ca. Cl.
Diabrotica soror, Lec. Ca. *
Monoxia puncticollis, Say. R.
Phyllotreta pusilla, Horn. Ca.
Bruchus pauperculus, Lec. Ca.
Eurymetopon convexicollis, Lec. Ca.
Phloxodes diabolicus, Lec. Cz. *
Nyctoporis carinata, Lec. Ca. R.
Coniontis elliptica, Csy. Ca. R.
 † " *lata*, Lec. Cl. * B. R.
 † *Coniontis lata*, var. *insularis*, Csy.
 Cz. * R.
Coniontis viatica, Lec. Cz. *
Coniontis subpubescens, Lec. Ca.
 Cz. *
 † *Cœlotaxis punctulata*, Horn. G. *
 † " *muricata*, Horn. G. *
 † " *angustula*, Csy. G. *
 † *Cœlus pacificus*, n. sp. N. R.
 † " *remotus*, n. sp. Cl.
 † *Eusattus robustus*, Lec. Cl. *
 " *politus*, Horn. R.
Eleodes quadricollis, Esch. Ca.
 " *dentipes*, Esch. Cl. N. R.
 " *scabripennis*, Lec. B. * R.
 † *Eulabis grossa*, Lec. Cl. * N. B.
 " *pubescens*, Lec. Ca.
 " *obscura*, Lec. R.
Amphidora littoralis, Esch. Ca. R.
Cratidus osculans, Lec. Cz. * R.
Cibdelis Bachei, Lec. B. *
Blapstinus rufipes, Csy. Ca.
 " *brevicollis*, Lec.? R.
Conibius seriatus, Lec. G. *
Notibius sulcatus, Lec. Cl.
 † *Helops Bachei*, Lec. R.
 † " var. G. *
 " sp. Ca.
Hymenorus infuscatus, Csy. Ca.
Isomira variabilis, Horn. Cl.
Pentaria nubila, Lec. Ca.
Anaspis collaris, Lec. Ca.
Mordellistena, sp. Ca.
 " sp. Ca.
Notoxus constrictus, Csy. Ca.

| | | | |
|---------------------------------------|---------|--------------------------------------|-----|
| <i>Anthicus californicus</i> , Laf. | Ca. Cl. | <i>Apion antennatum</i> , Sm. | Ca. |
| " sp. | Ca. Cl. | " <i>cedorhynchum</i> , Lec. | Ca. |
| † <i>Meloe barbara</i> , Lec. | B. * | <i>Cleonus basalis</i> , n. sp. | Cl. |
| " sp. | Ca. | <i>Smicronyx</i> , sp. | R. |
| <i>Rhynchites aureus</i> , Lec. | Cl. | <i>Anthonomus pauperculus</i> , Lec. | Ca. |
| " sp. nov.? | Ca. | <i>Tychius</i> , n. sp. | N. |
| <i>Trigonoscuta pilosa</i> , Mots. | Cl. R. | <i>Balaninus occidentis</i> , Csy. | Ca. |
| <i>Sciopithes setosus</i> , Csy. var. | Cl. | <i>Sphenophorus vomerinus</i> , Lec. | R. |

Concerning the value of certain names upon which there is a disagreement among authorities I am unable to offer any very well founded opinion. I am, however, inclined to doubt the validity of *Cryptognatha catalinae*, Horn, and *Cælotaxis angustula*, Casey; and on the other hand it seems probable that *Conibius guadalupensis*, Casey, is a good species and not a form of *seriatus* as recorded by Dr. Horn.

Tachys, sp.—Two specimens from Clemente are closely allied to *corax*, Lec., but seem distinct by the obviously less transverse thorax.

Amara insularis, Horn.—Very abundant on all the islands visited by the Pasadena party. I saw no signs of it on Catalina in midsummer, though the dried remains of *insignis* were common enough.

Agabinus glabrellus, Mots.—Not rare on Catalina. Very scarce on the mainland in the streams in the mountain canons.

Cercyon luniger, Mann.—A small number found in decaying seaweed on Catalina; *fimbriatum*, which may be found by thousands along the opposite coast, has not yet been detected.

Hippodamia ambigua, Lec.—Specimens from Santa Rosa might with equal propriety be placed with *convergens*. Unless some other character than thoracic markings can be discovered to separate these two so-called species they cannot be held as distinct. They constantly occur together everywhere in South California, and intermediate forms are frequent.

Rhizobius lophanthæ.—It is certain that this beetle is an importation from Australia, but it seems very probable that the pioneers were not introduced as advertised. How it first got here is a mystery, but it is surely here to stay, and is now quite as much at home as any of our native Scymni. Although already widely distributed in California, its occurrence on an island so distant and so rarely visited as San Clemente was, to say the least, unexpected.

Aphorista morosa.—According to Mr. Ricksecker this and *fata* are

sexes of the same species, the latter being the female. *Morosa* is in my experience much more commonly met with in So. California than *lata*.

Endeodes.—The species of this genus are among the most curious of the Coleoptera inhabiting the California sea beaches. They are to be found most frequently in April and May running about on the sand, or concealed under rubbish or driftwood so common in such situations. The two undetermined species are represented by one specimen each. That from Catalina was taken by me in July, and is quite surely nondescript, differing from our described species by the very minute elytra, as well as in coloration. The Santa Rosa example is almost entirely black, and is possibly a colour variety of *collaris*.

Phobetus comatus.—There is a very confusing amount of variation exhibited by specimens of this species from various localities in the State. Specimens taken by myself on Catalina, of small size, subimpunctate thorax with hind angles entirely wanting, seem quite distinct when compared with a series from Fresno county, of larger size, different colour, rather closely punctate thorax with distinct hind angles. I have, however, seen intermediate forms, and it would be unsafe to make a division without a large series from diverse localities. The name *testaceus* was originally given by Leconte to specimens from Santa Cruz Island, and it may possibly have to be revived.

Xylotrechus obliterated.—A fine series of this beautiful longicorn was taken by Dr. Fenyès on Catalina. All the specimens found were males, the females being indeed very rarely taken. The species occurs on willows.

Ipochus fasciatus.—This occurs rather plentifully on Catalina under the bark and on the branches of dead *Rhus laurina* (or *R. integrifolia*). The form, size, sculpture and markings vary greatly, often in a series taken from the same tree.

Balaninus occidentis, Casey.—This species has heretofore been confounded with *uniformis*, but is abundantly distinct. It is common enough on Catalina, but much less so on the mainland, frequenting several species of oaks.

A certain small species taken on Santa Catalina by myself in 1894, and again found on Clemente this year, has not been included in the list for the simple reason that its affinities are not yet sufficiently clear to admit of placing it even in a family sense. Two of our specialists to whom specimens have been sent have ventured opinions that are quite at variance; the case is therefore postponed for further hearing.

It is not unlikely that a few species have been overlooked in the preparation of the preceding list, but it is hoped that any such omission may not seriously impair its usefulness as a foundation on which to base any future reports on the Coleoptera of these islands.

It need scarcely be said that the 226 species enumerated here can represent but a fraction of the entire coleopterological fauna.

The following species, it is believed, are now made known for the first time. There are surely a number of other undescribed species, but their description would involve far more study than can now be devoted to them.

Cælus pacificus, n sp.—Broadly oblong, elliptical, moderately convex, piceous black, surface polished. Epistoma broadly sinuate, antennæ with three-jointed club. Prothorax equal in width to the elytra, a little more than twice as wide as the length at the middle, widest immediately before the base, sides rather feebly arcuate and strongly convergent, moderately densely evenly punctate throughout. Elytra twice as long as the thorax along the median line, not longer than wide, equally densely but more finely punctate than the thorax, the punctures not in the least asperate on the disk, and only very feebly so on the declivity and along the margin. Process of first tarsal joint extending under the next three.

Length, 7 mm.; width, 5 mm.

Very distinct from any of our described species by the conspicuously long prothorax, and from all but the next in the almost entire lack of elytral asperities. The marginal fringe of hairs on the prothorax is noticeably shorter and finer than in any of our mainland species. Described from a single example of unknown sex taken on San Nicolas, May 24. Since the above description was written I have seen numerous examples in the material collected by Dr. Eisen on Santa Rosa. With the exception of some variation in size these differ in no noteworthy respect from the San Nicolas type.

Cælus remotus, n sp.—Very convex, piceous black, legs and elytra brown. Epistoma broadly sinuate, antennal club four-jointed. Prothorax similar in outline to *pacificus*, but shorter; surface subopaque, densely coarsely punctate. Elytra shining, densely finely punctate, without trace of asperities. Process of first tarsal joint extending beneath the next two.

Length, 6.5-7 mm.; width, 4-4.5 mm.

The above brief description is sufficient to characterize this some-

what remarkable species, of which a single pair was taken (June 3) on San Clemente.

The marginal fringe is longer than in *pacificus*, but thinner than usual.

Both the above described species were found under rubbish at a distance from the shore, and have probably the habits of *Coniontis* and *Ceilotaxis* rather than those of the other members of the genus. This might indeed be safely inferred from the less developed marginal hairs and lack of elytral asperities, which have an undoubted connection with the habits possessed by the mainland species of burrowing in loose sand. Whether we have here a change from the ancestral mode of life, due to a change of environment, or whether, as seems to me more likely, the burrowing habit is of recent development and the island species are the surviving representatives of an earlier type, is an interesting question.

Cleonus basalis, n. sp. — Moderately stout, integuments black, polished. Beak three-fourths as long as the prothorax, not dilated at tip, rather thinly clothed above and beneath with short cinereous hairs, sides glabrous, above subcarinate in basal two-thirds, rather coarsely punctate throughout. Prothorax as long as wide, sides very slightly convergent, apex feebly constricted, basal lobe angulate, surface very closely densely punctate, feebly carinate in apical half, deeply excavate behind. Vestiture condensed in four narrow vittæ; the two dorsal approximate in front, posteriorly divergent and incomplete; the lateral vittæ dislocated at the apical constriction. Elytra barely twice as long as wide, humeri rounded, tips separately rounded and scarcely acuminate; striæ composed of large, closely-placed punctures; intervals scarcely wider than the punctures, especially on the disk; base strongly impressed each side, leaving the base of the third and to a less degree that of the sixth interval strongly tumid. The third, fourth, fifth and outer three intervals are so thinly clothed as to appear glabrous; the first is, however, very finely pubescent throughout, as is the seventh behind the middle. The dark areas contain a few small spots of condensed hairs, and there is a larger conspicuous spot at the base of the second interval. Lower surface and legs as usual. The third joint of hind tarsi is small, but obviously wider than the second.

Length, 10 mm.; width, 3.5 mm.

Hab.—San Clemente.

The single male above described must evidently be placed near

quadrilineatus by Casey's table — Coleop. Not., III., p. 186 — but the deep basal excavations of the thorax and elytra, as well as the dense punctuation of the former, clearly separate them. The ocular lobes are moderately well developed in *basalis*, and are said to be wanting in *quadrilineatus*.

Attalus subfasciatus, n. sp.—Very small, narrow, depressed, black, thorax with sides behind and base narrowly testaceous, elytra with a slightly antemedian pale fascia which is interrupted at the suture. Head broad, antennæ slender, not in the least serrate, reaching the middle of the elytra (♀), or as long as the entire body (♂), the four basal joints pale. Thorax narrowed behind, of the same form as in *Endeodes*. Elytra parallel (♂), or posteriorly dilated (♀). The pubescence consists as usual of very short semi-erect hairs, with longer erect darker hairs sparsely placed.

Length, 1.5–2 mm.

Hab. — San Clemente.

Described from one ♂ and eight ♀s. A very peculiar little species, differing in antennal structure, form of thorax and style of elytral coloration from all other species in our fauna. It may for the present be placed next to *lobulatus* in which there is a faint indication of the present form of thorax.

Colaspidea subvittata, n. sp.—Piceous, with more or less distinct greenish-bronze lustre; legs, more especially tibiæ and tarsi, rufescent. Sides of prothorax not strongly rounded, punctuation moderately close, a little coarser on the elytra. Pubescence long (for the genus), recumbent, distinctly subvittate on the elytra in fresh examples. Length, 3.5–4.5 mm. Found abundantly by me on Catalina, also brought from Clemente. There is practically no variation except in size in the large number of specimens examined. The mainland species, on the contrary, exhibit a bewildering amount of variation in size, colour, punctuation, and even in form. One variety of varicolor is of nearly the same colour, but the pubescence is erect and the thorax more strongly rounded at the sides. The pubescence is much more easily removable in *subvittata* than in any of the other species, and the vittate arrangement is scarcely evident except in very fresh examples. In the males the antennæ are somewhat longer and all the tarsi moderately dilated—characters common to all the species of the genus.

Dermestes tristis, n. sp.—Length, .22-.26 inch. Elongate convex, parallel, black, clothed above with black pubescence, with a sprinkling of paler hairs on the prothorax, and rarely mottled with cinereous hairs on the elytra. Scutellum densely clothed with ochreous hairs, usually forming the only relief to the sombre aspect of the upper surface. Thorax not very obtusely rounded in front, anterior portion of lateral margin invisible from above, sides uniformly rounded, slightly sinuate before the front angles, which are distinct and only slightly obtuse. Surface of thorax densely, more coarsely punctate than usual. Beneath clothed as usual with dense white pubescence, with lateral series of black spots; prevailing colour of last ventral whitish; legs annulated with white. Males with median pits on third and fourth ventrals, tarsi clothed beneath with spinous hairs. Occurs in various parts of maritime So. California, and on Santa Rosa Island.

One of our smallest species, perhaps most nearly resembling *talpinus*. The latter is, however, more robust, with ochreous and gray mottlings on the elytra, sides of thorax more strongly rounded near the base, and pubescent male tarsi.

It seems not to have been noticed that in a considerable number of our species of *Dermestes* the front and middle tarsi of the male are rather densely pubescent beneath. The character is an important one and enables us to establish the distinctness of *Mannerheimii*, which has never looked right as a variety of *marmoratus*. These last named species may then be thus compared:

MARMORATUS.—Size large (.40-.45 in.), elytra mottled with ochreous and cinereous hairs, tarsi spinous beneath in both sexes.

MANNERHEIMII.—Size smaller (.24-.32 in.), elytra mottled with cinereous only, front and middle tarsi (♂) pubescent beneath.

HEPIALUS QUADRIGUTTATUS, Grote.—This large salmon-pink variety was taken this year near Metis, P.Q. Messrs. L. Reford and E. Brainerd, of Montreal, chanced one day to pick up the wing of a specimen on a little dry area in a swamp several miles from Metis. They returned to the village for a lantern, and then tramped back again. Their industry was rewarded by the capture of two specimens. They saw five others, and report that the moths appeared about nine o'clock p.m., and flew in a zigzag horizontally, not up and down like *H. thule*. This species has been taken in Ontario by Mr. Elcome, at Peterborough, and at Roach's Point, Lake Simcoe.

LEDRA PERDITA vs. CENTRUCHUS LIEBECKII.

BY F. W. GODING, M. D., PH. D., RUTLAND, ILL.

In the February CANADIAN ENTOMOLOGIST, page 38, Prof. C. F. Baker contributes an article on *Ledra perdita*, A. and S., in which he attempts to identify the insect described by Amyot and Serville under that name with my *Centruchus Liebeckii*. Those authors describe their species from an admittedly inaccurate figure, the original type having been destroyed. They state that their species is from Northern America. [See note.] Van Duzee states (fide Baker) that *perdita* is from Pennsylvania, on what authority I do not know, and Prof. Baker decides that because Van Duzee gives that State as the habitat of the insect, and my species having been described from the same commonwealth, they must be identical. As there is no proof beyond the dictum of Van Duzee that *Ledra perdita* is from Pennsylvania that point may be dropped until we hear further from him. He is too careful a student of our Homoptera to be guilty of confusing a Membracid with a *Ledra*. The facts regarding Fitch's identification are these: While in Washington a few years ago, and working over the Fitch material, I found an example of *Liebeckii* labeled in Fitch's handwriting, "*Ledra perdita*, A. and S.," and "capra, Mels.," both names being on the label, which I recorded in the CANADIAN ENTOMOLOGIST, Vol. XXV., p. 172. Fitch never published his opinion regarding this species. Prof. Baker (l. c.) says: "So peculiar in form is it that there is not a possibility of confusing it with anything else in our fauna." Since that was written he has come into possession of a copy of Fowler's great work on the Membracidae of Mexico and Central America, and I do not doubt that since he has examined Fowler's figure of *Centruchoides laticornis* his opinion has undergone a change, for the figure of *perdita* certainly resembles that figure as closely as it would a figure of *Liebeckii*. The same is true with several others of the Centrotinae, viz., *callicentrus*, etc., etc., from "Northern America."

NOTE.—I do not know where Mr. Van Duzee publishes my reference to this species beyond a note in his catalogue of the Jassidae, wherein he says: "One American species of *Ledra* has been described, but I have not yet seen an example." Doubtless he here refers to Amyot and Serville's species.

Now, regarding *Microcentrus caryæ*, Fitch, and *Centruchus Liebeckii* being congeneric, at the time I wrote the description of *Liebeckii* the close relationship between my species and *caryæ* was recognized, but as Stal says that prothoracic horns are absent in *Microcentrus*, I looked for some other modern genus in which to locate, temporarily, the species. The Old World genus *Centruchus* seemed to fit it the best, and that generic term was used although there was an extra discoidal cell which must sooner or later place it in a separate genus. This has been done by Fowler, who has described the genus *Centruchoides*. Of the two species the neururation is identical, and the entire anatomy (other than the presence of lateral horns in *Liebeckii*) is the same. I have before me the example of *Liebeckii* mentioned by Prof. Baker as having aborted horns. In my collection is an example with horns still more aborted, and while in Washington a few weeks ago I found several similar examples in Mr. Heidemann's collection. That gentleman informed me that he had taken both forms together, with their larvæ and pupæ, while collecting. This shows that the horns are variable, and, as I believe, in some cases absent, as is true of *Platycotis sagittata*, Germ., as recorded in my paper "Fitch's types."

Mr. Fowler has re-described the genus *Microcentrus* as *Phaulocentrus*, and after stating that *caryæ*, Fh., belongs to his genus, describes and figures four new species, viz.: *pileatus*, *proximus*, *sordidus* and *cornutus*; the first three closely related to *caryæ*; the fourth, I believe, bears the same relation to one of the others that *Liebeckii* bears to *caryæ*, and I should not be surprised if his **Centruchoides laticornis* was still another instance.

In conclusion, I will say that the name *Ledra perditæ*, in my opinion, should be forgotten. The type was destroyed; the description, which might apply to any one of a dozen species of *Centrotinæ*, drawn up from an unrecognizable figure, and there is no possible way of determining what insect the artist had in hand when he drew the figure from which Amyot and Serville drew up the description of *perditæ*. Let the name be buried in oblivion. I believe *caryæ*, Fitch, and *Liebeckii*, Goding, are one and the same species. As Fitch's name has priority, the name *Microcentrus caryæ*, Fh., should stand, while the horned form may be known as *var. Liebeckii*, Godg.

* *Centruchoides* is not a MS. name. It is described in Fowler's work, page 159.

A PRINCIPLE TO OBSERVE IN NAMING GALLS: TWO
NEW GALL-MAKING DIPTERA.

BY WM. H. PATTON, HARTFORD, CONN.

CEDASPIS-SOLIDAGO ATRA.

Galls do not differ from those of *Æ. polita*, as described by Osten Sacken (Tr. A. E. Soc. ii., 301; 1869).

This is an addition to the list of gall-making Trypetas given by Osten Sacken in *Psyche* for April, 1880. I bred both sexes from Solidago galls, Sept. 8, 1875, in Connecticut.

Flies.—Female agrees perfectly with Loew's description of a specimen from New York. The eyes in the living flies are green, with two longitudinal purple stripes. The shed puparia are left in the galls, and are of a delicate texture and milk-white colour. The New York specimens from which *atra* was described approach *polita* in all their points of difference from the Mexican specimens. Whether the Mexican specimens belong to the same species is a question which does not concern us in determining the synonymy of *atra*. If the pale gray border of the wing cross-bands was darkened and one of the bristles on the lateral border of the front was lost (differences which might well arise with increased maturity of the specimens) we should have nothing to separate the species excepting the slightly greater divergency of the second and third bands, and it is probable that this greater divergency would disappear with the blackening of the gray borders. *Æ. atra* is a later name than *Æ. polita*.

CECIDOMYIA-CELTIS (new genus) DESERTA, new species.

Galls are hollow, elongate swellings of young twigs, from which emerge, about the first of June, single Cecidomyian flies from a perforation near the base. Length of gall one half inch to one inch.

On Hackberry (*Celtis occidentalis*); Orange, Connecticut.

The name describes the genus.

This gall I name and describe to illustrate a principle which may be useful in naming galls of which the makers are unknown. It does not seem proper to refer such galls to the genus of plants alone, as was done by the older botanists, nor to the genus of insects alone, as is at present the fashion, but to a combination of the two, thus: *Cynips-quercus*, *Cecidomyia-quercus*, *Cecidomyia-salix*, etc. All *Cynips* are, it is true, confined to *Quercus*, but it is the gall and not the insect for which I

propose this nomenclature; besides, *Quercus* supports other genera of gall-makers. The combined generic name is in the nominative case and will not conflict with the many specific names which have been drawn from the plant and used in the genitive. In many cases the genitive of the plant genus has been used in combination with a specific name not derived from the plant, as *Cynips-quercus-futilis*. The suggestion made by Osten Sacken that in these cases the genitive or its initial (which is often all that is used) should be dropped seems worthy of being carried into effect, as this genitive appears in most cases to have been inserted by accident or error.

This nomenclature also has the advantage of not presenting the appearance of describing what is unknown; it has no binding force of priority over the specific name of the insect when that is discovered. It has, however, a priority in the description of *galls*, and the specific name should be retained as the name of the *gall*, even though the insect should by chance receive a different name or it should prove not to belong to the genus under which the gall is described. It also has the advantages of simplicity and of conformity with medical usage in naming gall diseases of animals.

To exemplify the principle I name the following galls described in the 5th Rept. U. S. Ent. Comm.:

- p. 612, 30, *C.-c. oviformis*.
- p. 613, 31, *C.-c. semenrumicis*.
- p. 613, 32, *C.-c. pubescens*.
- p. 613, 33, *C.-c. capsularis*.
- p. 614, 34, *C.-c. spiniformis*.

THYREOPUS ADVENUS (Sm.), PACK., A PROTECTOR OF THE ARMY WORM.—This species is an exception among burrowing wasps in being injurious to vegetation, as I have found it killing and carrying to its nest *Sarcophaga*, *Musca domestica*, and that enemy of the Army worm, *Belvosia unifasciata*. The wasp forms its small hillocks under the shelter of shade trees late in August, in Connecticut. In rainy summers its numbers are much reduced. *Miltogramma* pursues the wasp with felonious intent. The wasp may be destroyed by pouring strong alkaline washes into the burrows.

The *B. unifasciata* varies in having a red tail, contrary to the name *flavicauda* by which it was formerly known. W. H. PATTON.

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NOTES ON THE LIFE HISTORY OF COLIAS INTERIOR, SCUD.

BY H. H. LYMAN, MONTREAL.

When in New York, towards the end of May, 1894, I paid a visit to Mr. B. Neumögen, who, though suffering considerably from the fatal disease to which, after a brave fight, he finally succumbed, received me kindly, and after a short conversation sent me upstairs to Mr. Doll to get the names of certain species which I had brought for determination.

In one of the drawers which Mr. Doll showed me I found several specimens of *Colias Interior*, one being of a very rich shade of colouring, almost orange, in fact. Asking where they came from, I learned that they had been taken the previous season at Camp Lou, on Osgood Pond, in the Adirondacks, and I immediately determined, if possible, to get eggs. Early in July I wrote to Mr. Neumögen to ascertain the best time to be on the happy hunting-grounds and for any suggestions, and received a post card, dated 9th July, written on a railway train, and the last communication I received from him, telling me that then was the right time. I was unable to go just then, but on the 20th I left by the evening train over the Adirondack and St. Lawrence Railway, and reached Paul Smith's hotel shortly after 9 o'clock. The 21st it rained all day till late in the afternoon, but the 22nd was fine, and I soon had 2 ♀ ♀ of *Interior* caged for eggs. For the cage I used a tomato can filled with such soil, chiefly sand, as I could find, and in it I placed two species of *Vaccinium*, two willows, *Kalmia Augustifolia*, *Trifolium Stoloniferum*. The following day I took five more females and two males. One ♂ *Philodice* was taken courting a ♀ *Interior*, and was confined with the ♀ ♀ to see if it would copulate with one of them, but it did not do so, so far as I observed. Three of the freshest ♀ ♀ were killed for the cabinet, but the remaining four with 1 ♂ *Interior* and the ♂ *Philodice* were kept caged. The 24th was again rainy, and in the afternoon I left for home, carrying my menagerie with me. On the 26th July the plants were changed to a flowerpot of larger size than the tomato can, and the following species of plants were added: *Melilotus Officinalis* and *Alba*, *Amphicarpæa Monoica*,

Vicia Cracca, *Desmodium Dellenii*. One ♀ was found dead, and one very feeble and apparently dying. The living ones were fed with sugar and water, and here I may be permitted to say that the only success I have ever had in feeding butterflies was when I uncoiled their tongues with a pin bent at the point, and then put a camel's-hair pencil dipped in the syrup to the tongue. They will then continue to feed as long as they are hungry; but holding the brush in front of them and blowing gently towards them, as the authorities tell us to do, I have found a failure, and putting a saturated sponge in a cage utterly useless. No eggs were observed at this time, but one at least must have been laid some time before, as a larva hatched on 30th. On the 29th I was ill in bed all day, but on the 30th I found that from 28 to 30 eggs had been laid, nearly all on the *Vaccinium*, and that one larva had hatched as above stated. One egg was laid on *Amphicarpæa Monoica*. One or two eggs were laid after the 30th. I divided about half of the eggs between Messrs. Fletcher and Scudder, sending eight to the former and six to the latter.

Of the eggs that I kept, one hatched on 30th July, four on 4th August, eight on 5th, and two on 6th. The egg period must therefore have been about six or possibly seven days in one or two instances.

The egg and first stage of the larva have been described by Mr. Scudder in his great work on butterflies, but as that work is unfortunately not available to all entomologists, it will do no harm if I give my notes, imperfect as they may be, in full.

Egg.—Length, $1\frac{1}{3}$ mm.; diameter, .48 mm. Similar to *Philodice* in shape. Number of ribs, about 20. At first, white tinged with greenish-yellow, soon turning reddish-orange. Just before hatching turning dark. The larva can then be seen through the shell, standing on its tail, with a clear, vacant space above the black head. The larva emerges a little below the top, just where the head is. One that was watched crawled slowly down the shell on to the leaf, moving its head from side to side on the leaf as though spinning a silken path, and as soon as it was all on the leaf, it turned round, climbed to the top of the shell, and began to devour it, and ate it all up, its meal taking 40 minutes. Most of the larvæ did not eat more than half of the shell, and some did not eat any.

Young larva.—Length, 1.91 mm.; width of head, .366 mm.; head black, the hairs pellucid. Body brownish-green, finely transversely striated, with about five striations to each segment. Skin faintly shagreened with yellowish-brown; the striations are of same colour; the raised points

are pale in colour, black at the summit. Hairs pellucid, club-shaped, especially on second segment, where they are considerably longer than on the other segments.

Tried the larvæ with *Vaccinium*, two or three species of birch, two or three species of willow, *Amphicarpæa Monoica*, *Epilobium Augustifolium*, and several other plants at a venture, but in all cases they crawled off the leaves on to the side of the jar. One that was afterwards placed upon a willow leaf just died and dried up where it was put. On 5th August found the leaves of *Vaccinium* eaten in several small patches, and a sprinkling of tiny frass in the bottom of the tumbler. All the larvæ behaved as though *Vaccinium* were not their proper food plant, leaving it and wandering around the glass, and only returning to it when they found that they could not get anything more to their taste. I have, however, since then, seen the same thing done by the larvæ of a Noctuid, the eggs of which were found on the leaves of a shrub, and I therefore judge that it is owing either to a desire to explore their surroundings or because they object to the confinement. The frass from the young larvæ must have been ejected with considerable force, as the jar was always sprinkled half way up the side. The mortality, through drying up apparently, was very heavy, and by the 15th of the month only five remained out of fifteen, and in my despair I wrote to Mr. Scudder for suggestions, and on the 17th received an answer from him describing his method of unconfined feeding. I then filled a homœopathic vial with water, bored a small hole in the cork, and inserted a small sprig of *Vaccinium*. The vial I placed in a wineglass, with earth around it to support it, in order that should the larvæ fall off the leaves they would be caught, and also to decrease the danger of their straying. The earth I watered, so as to render the air about the larvæ slightly moist. I then transferred all that remained alive, viz., three, as two had perished since the 15th, to the sprig. The following day I found that one had not moved from the spot where I placed it, and was apparently dead and drying up, but the two others were healthy, and thenceforward I had no trouble, and carried these two right through to imago. One of these larvæ passed first moult on 18th August, and the second on the 20th. Just before the moult the larva seems quite smooth.

After first moult: Length about 3.9 mm., rather plump, colour dull green, head same colour as body, head and body covered with very short, minute whitish hairs, giving a shagreened appearance; faint, darker green longitudinal lines are visible under a lens.

On the 20th I left for a short holiday at Murray Bay, carrying my menagerie with me, and my arrival with it caused a certain amount of curious interest among the guests at the hotel. The larva eats the parenchyma of the leaf in small round patches; mine fed on the upper side, and when resting, they rested along the midrib, head sometimes up and sometimes down. Mr. Scudder tried his larvæ with *Vaccinium Corymbosum* and *V. Vacillans*, and found that the one on the latter ate with twice the zest of that on the *Corymbosum*, and further, that the one on the latter fed on the upper surface of the leaf, while that on *Vacillans* fed on the lower surface.

About the end of August or first of September they ceased feeding and became lethargic, lying along the midrib of the leaf, near the petiole, upon a slight carpet of silk, and as they were plainly hibernating, and I feared they might dry up, I removed the leaves from the sprig, cut away the surplus space of the leaves, and secured them to the bottom of a pill-box with a touch of glue. When the pieces of leaf seemed perfectly dry, I put the pill-box in a bottle, corked it and placed it in the refrigerator. Some time afterwards I found that in some way water had got into the bottle, and the card pill-box was wet and mouldy. I took it out, removed the mould as well as possible with a camel's-hair pencil, and allowed the box to dry. The larvæ were apparently healthy, and I then put the box out of doors on a gallery, where the occupants would be as cool as possible and protected from sun and rain.

As soon as the snow came I got a small wooden box, cut several small pieces about an inch square out of the upper edge for ventilating purposes, put it on the ground, with a brick on the bottom inside, placed my box with hibernating larvæ on the brick, and covered the box with an inverted tin tray that I had had made, the tray projecting about an inch all around the box, and then covered it with snow. In the spring, as the snow gradually melted, I had more brought from the shady parts of the garden to pile over the box, and finally had the much-reduced heap covered with ashes to protect what little snow remained from the genial warmth of the end of April. I wrote to Mr. W. H. Edwards to try to secure some *Vaccinium* from the South, offering to pay a boy to get it, but Mr. Edwards wrote that he did not know where to get it, and advised me to try willow. I then appealed to Mr. Jack, at Jamaica Plain, and a few days later to Mr. Fletcher, at Ottawa. Both kindly responded promptly, and as a result I received a plentiful supply of shoots with the first tiny

leaves coming out. The snow and ashes were removed from the top of the box on 1st May, and the box opened. The card pill-boxes were found very damp and mouldy, but the two larvæ were sound and healthy in spite of the mould all about them, but were naturally somewhat shrunken in size from their long fast.

At midday, on 3rd May, as I found that they had moved from their positions, I placed them very carefully upon the open buds of a sprig of *Vaccinium*, arranged in water as previously. They soon crawled on to the stem and rested, one head down, the other up.

During the 4th they remained lethargic, in the same position, but by the morning of the 5th the one which previously had its head up had turned round and had its head down, and by the evening I found that they had eaten a little. They now eat the entire leaf, which is young and tender.

On 9th May they moulted for second time.

After 2nd moult. — Length, about 7 mm. Head green, slightly roughened with minute brown points. Body green, with many minute yellowish raised spots, each tipped with a minute brown hair or point. Along the spiracular space there is a raised band like a fold, mottled with white, pink and yellowish.

On 12th May one passed 3rd moult about 3.30 p.m. while under observation. When first seen the old face still adhered to the mouth-parts of the new, but the skin had been worked more than half way to the anal extremity. It only took a very few minutes to get clear of the old skin, and then it proceeded to divest itself of the old face, which it soon accomplished.

After 3rd moult. — Length at rest, 8.6 mm. Head bright green, roughened as before. Body darker green, shagreened with yellowish raised spots, with short brown hairs or points. Spiracular fold as before, whitish, with orange and yellowish patches and markings.

The weather turned cold and wet, and the second larva was two or three days later in moulting than the other, but the exact date was not recorded.

The species of *Vaccinium* that Mr. Fletcher supplied me with was *Canadense*, but I had also received *V. Vacillans* from Mr. Jack. On the 17th a careless servant threw away my supply of *V. Canadense*, so I gave the larvæ the *V. Vacillans*, but the following day I found they had refused it and had eaten nothing, so I offered them some of the sprigs that I had

first received with the opening buds which I had kept in a tin, and they then began to feed eagerly upon these. The arrival of a fresh supply of *V. Canadense* from Mr. Fletcher removed all cause for anxiety.

On 25th May both were observed to be apparently fixed for 4th moult. Length as contracted, 14 mm. The spiracular fold is pink, bordered with white and interrupted by the spiracles, which show as a green oval ring on the white band with a white centre. There is no trace of any pink or other stripe above or below the spiracular one. There is a dark green dorsal line, and the space on each side of it has a yellowish-green appearance from the minute yellowish warts, but the subdorsal or lateral region is of a bluish-green shade, and the warts are whitish. The region above the spiracular fold is thus about evenly divided between bluish and yellowish green.

One was found, about 10.45 a. m., on 26th May, to have passed 4th moult, and was described at 1 p. m.

After 4th moult.—Length at rest, 16 mm. Head and second segment bright green, finely sprinkled with black points, from which arise minute hairs, blackish above, whitish below. Dorsal region green, with a brownish-yellow tinge, as before. Lateral and sub-spiracular regions bluish or whitish green, the minute hairs being whitish. Spiracular fold white, overlaid along the middle with coral-red. On following morning the other larva had passed 4th moult, and on 31st the former was apparently mature, as it left its food and crawled up to top of cage. I described it in the afternoon, but it was very restless, sometimes crawling very fast, and sometimes in a very funny, jerky manner.

Mature larva.—Length, 25 mm. Rich dark yellowish-green on head and above, with narrow dorsal dark stripe bluish-green on sides, with innumerable small papillæ and minute hairs of a dark brown or black colour above, partly white on sides, and white below spiracular fold. Spiracular fold white, with bright crimson stripe included. Head small; as finely dotted as the body. Below bright green; feet and prolegs the same.

Mr. Fletcher kindly gave me the following note on the general habits of the larva:

"Larva decidedly sluggish for the greater part of the time, but when feeding, which was generally twice a day, very nervously active, biting with great rapidity, and moving slowly with short, jerky steps."

The following particulars are also taken from Mr. Fletcher's notes on the mature larva:

"Length, $1\frac{3}{8}$ inches when extended feeding. Head, 2 mm. broad; narrower than segment 2. Segment 3 slightly the widest of all. Body cylindrical from 4 to 10 inclusive, then tapering slightly to end. Head concolorous with body, evenly reticulated all over with dark green, the interspaces yellowish and pubescent, the bristles on apex short and black, those toward the mouth much longer and white. Mandibles darkened at apex, process beneath the neck honey-coloured. Ocelli six, in two lines, the anterior of 4 slightly curved forward and lying on a yellowish-white stripe, the other two lying behind these, one above the other, smaller than those of the anterior row. In the anterior row the 2nd and 3rd are the largest, all blackened at base, vitreous at apex. No. 1 of posterior series is the smallest and least conspicuous."

On 1st June one fixed for pupation, and the other on 2nd. Pupation occurred on 3rd June.

Chrysalis very similar to that of *Philodice*. Green, vermiculate with yellowish-white markings over upper part of thorax and all the abdomen, giving a pea green effect. A green dorsal line extends the whole length. When first formed, there is a spiracular band, similar to that of the larva, running from the wing-case to the tail, but the crimson soon disappears, and the band becomes yellowish and inconspicuous. Half way between the band and the ventral surface there is a broken reddish-brown stripe on the first three abdominal segments, beyond the wing-covers. The head is marked with darker green, yellowish-white at apex. The girdle is rather long, and the chrysalis hangs loose from its support. Length of chrysalis, 18.7 mm.; greatest thickness, 6 mm.

On 12th June the antennæ cases were crimson, tipped with yellowish-green, and the outer and apical margins of the wing-covers were the same. All the parts between the antennæ cases were brownish-green, the eyes deep green, the ventral half of the abdomen yellowish, the wings greenish-yellow. While I was describing it, it bent itself from side to side, bending the abdominal joints as much as possible.

Both pupæ disclosed the imago on afternoon of 13th; the chrysalis stage being thus ten days. Both were males. I had intended sending away one larva to have a coloured drawing made of it when mature, and of the chrysalis when formed, but my ones matured so fast that I was too late for this, so appealed to Mr. Fletcher to send his one specimen, which had lagged a little behind mine in development. He very kindly acquiesced, but, unfortunately, the larva pupated in the mail, with fatal

result. From the length of the larva, 138 inches, he judged that it was a female. The form of the species which occurs in the Adirondacks is that with yellow female, but what that form should be called is a matter of some doubt. In Mr. Scudder's "Butterflies of New England," page 1107, he suggests that as this form was first described when the species was re-described by him, under the name *Eurymus Philodice*, var. *Laurentina*, it should be designated by the trinomial appellation, *Eurymus Interior Laurentina*, the pallid, or white, female being called *Eurymus Interior Interior*. But it seems to me that the doctrine of priority of description cannot govern the matter in the case of a variety, else we may have what is the normal form in nature labelled as the abnormal in our cabinets, and the abnormal variety of nature standing as the normal form in our cabinets. Clearly, where there is dimorphism in one sex of a species, the form which predominates in a marked degree must be considered the normal form, and the other the varietal, all original descriptions to the contrary notwithstanding. Priority must rule in regard to the species, but it must give way where it clashes with nature in regard to varieties.

The question, then, to be settled, is what is the predominating form of the female in this species? Possibly at present the material in cabinets may not be sufficient to settle the matter authoritatively, but I believe it will be found that the yellow or syngenic form is the normal form, and that the antigenic or pallid female is only an albinic form, as in *Philodice*.

Among the types of *Interior* there was only one female, and this happened to be of the pallid form described by Mr. Scudder as "white, with a very pale yellowish tinge"; but among the large number brought from Cape Breton Island by Mr. Roland Thaxter there were eight pallid females, and ten which Mr. Scudder called gynandromorphic females, by which not very happy term, I suppose he designated the yellow form.

Besides the seven females taken by me in the Adirondacks and the three from the same region that I saw in Mr. Neumögen's collection, I have one from the *Godbout river, in the Gulf of St. Lawrence, and one from Nepigon, and all these are yellow, and I do not remember having ever seen a white one, though it is possible I may have done so. Dr. Bethune has informed me that he took a good many at Nepigon, and all were yellow. Mr. Fletcher wrote me that he had taken 18 ♀♀ at Nepigon, and of these 11 were of what he calls the pallid form, and 3 at

*The man who collected for Mr. Couper at this locality was named Comeau, not Corneau, as printed in the CAN. ENT.

Ottawa, of which one was pale, and that Prof. Macoun took 3 ♀♀, all yellow, in Prince Edward Island; but I do not think Mr. Fletcher has ever had a white female Interior. Mr. Fletcher has also one ♀ of the yellow form from British Columbia. If my belief in this matter should prove to be well founded, the species should simply be known as *Colias Interior* with an albinic variety of the female, and the name *Laurentina* should simply fall into the synonymy.

Mr. Scudder further says that "the males are very much more numerous than the females," and among his "desiderata" asks why this is so.

On general principles I should think such a condition of things extremely doubtful, and I believe Mr. Scudder's assertion to be founded on insufficient evidence, especially as in the collection which Mr. Roland Thaxter made in Cape Breton, and which furnished Mr. Scudder with his types of *C. Laurentina*, there were 18 females to 21 males, certainly no great discrepancy.

I have only twice met with this species in numbers, but neither experience would lead me to form such an opinion. The first occasion was on 8th July, 1890, along the line of the C. P. R. west of Sudbury, when travelling to Nepigon in company with Mr. Fletcher. Whenever the train stopped for a minute or two we jumped off with our nets, and I think we took a dozen between us, and I believe all were males, but it was evidently too early for the females, as the males were quite fresh, and the next day when we arrived at Nepigon, where the season is later, we found that the males had not yet appeared. I think it probable that a fortnight later plenty of females would have been flying near Sudbury.

I may say, however, that the evidence of Mr. John D. Evans, of Trenton, who collected for a number of years at Sudbury, is rather on the other side, as out of a series of 31 specimens in his collection only 4 are females. This is probably accounted for by the fact that out of the 31 no less than 19 were taken prior to July 5th, and for 4 others the date of capture is unknown, and I have already pointed out that the females probably appear later. Twenty-one out of the 31 were taken by Mr. Evans in 1886, who found this species comparatively scarce in later years.

In 1894, at Paul Smith's, I took seven females to two males, but, of course, the former are easier of capture. When this matter has been further investigated, I am confident it will be found that no serious

discrepancy in numbers exists between the sexes. In speaking of the probable or possible life history of the species, Mr. Scudder says (page 1110): "Mr. Fletcher obtained them (the eggs) July 16-24, and they hatch in seven days. This gives ample time for the caterpillars to attain maturity and pass into pupa for the winter; but what the creatures actually do, and how winter is passed, is unknown. There is, however, certainly but one brood anywhere." It seems to me, however, that it may be mathematically demonstrated that any species of which there is only one brood in the year and which does not appear on the wing till July or the very end of June must pass the winter in the larval condition not more than half-grown.

THE LIFE HISTORY OF *EPIRRANTHIS OBFIRMARIA*, HBN.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Epirranthis obfirmaria is a swamp insect. I take it in "The Gomin" near Quebec, where, in ordinary seasons, it is on the wing from early in June till the close of that month. The following is a brief description of this beautiful insect:

♂. Expanse of wings one inch; length of body half an inch; length of antennæ three-tenths of an inch. Colour a rich, warm brown. The primaries have a broad ochreous band, widest at the costa, outlined with dark brown. In this band, not far from the costa, is a dark brown spot. The secondaries have the outer third of the same warm brown as the primaries, with an ochreous patch at the outer angle of it. The rest of the wing is ochreous, clouded towards the base. The marginal dark brown line of this ochreous portion is somewhat angulated. In the part of lightest colour in the wing is a conspicuous dark brown spot. The antennæ are pectinated.

♀. Expanse of wings an inch and one-fifth; length of body nine-twentieths of an inch; length of antennæ two-fifths of an inch. The marks in the wings are similar to those in the wings of the male, except that there are no brown dots in the primaries. The colours are much brighter: the darker portions are of a rich brick-red, and the lighter of a clearer yellow than in the male. The brown spots in the secondaries are small. The antennæ are filiform.

Eggs of E. obfirmaria.

The eggs of *E. obfirmaria* are laid dispersedly and unattached. They are pale greenish-yellow, small, and bluntly oval in outline. They

have minute granulations on the surface. A batch of the eggs, laid on the 14th of June in the present year, hatched on the 27th of the same month. The larvæ fed on *Vaccinium*, *Cassandra*, etc.

Newly-hatched larva.

A "looper," one-tenth of an inch long, suspended itself by a line. It was black with white patches on each segment, and presented a strangely checkered appearance. The head was large and black; the mouth-organs white. The feet also were white. The claspers were wide apart—beside them it had but one pair of prolegs. There were a few bristles at the anal extremity, and along the sides of the larva. It moulted July 3rd.

Larva after first moult.

One-fourth of an inch long; brownish-green in colour; had five conspicuous brown warts on each side of the body. The head was light brown, and the legs brownish-green.

[NOTE.—The habit the larva has of eating its *exuvie* makes it exceedingly difficult to follow its changes. The insect I am telling of, however, certainly moulted on July 16th.]

Larva after moult of July 16th.

Length three-fifths of an inch. Colour brownish-ash above, with fine paler lines. The fourth and terminal segments were somewhat lighter in colour. Underneath the larva was of an Indian yellow shade. The face was flat, outlined with brown, and had two white spots near the upper edge. The spiracles were dark brown and appeared in a line of folds or broken ridges. The larva moulted July 24th. After moulting it ate its old skin all but the mask.

Full-grown larva.

Length four-fifths of an inch. Colour brownish-ochreous. It had a dorsal line faintly outlined with brown, and on either side of this a row of dark brown spots. It had also a row of similar spots just above the spiracular line. This line was pale ochreous and warty. Below it was a row of oblong, dark brown patches. The spiracles were dark brown.

The larva ceased to feed in August, and towards the middle of that month gathered a few leaves together and spun a light cocoon somewhat after the manner of *Caterva catenaria*.

DESCRIPTIONS OF FIVE NEW GENERA IN THE FAMILY
CYNIPIDÆ.BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DEPARTMENT OF INSECTS,
U. S. NATIONAL MUSEUM.

Subfamily VIII.—CYNIPINÆ.

Xystoteras, gen. nov.

This new genus somewhat resembles *Philonix*, Fitch (= *Acraspis*, Mayr), and agrees with it in having 14-jointed antennæ, but otherwise is quite different. The head, thorax and abdomen are highly polished, impunctate, the mesonotum being entirely without any trace of the parapsidal furrows, and in this character differing widely from all other of the agamous genera of the Cynipinæ. The absence of the parapsidal furrows being peculiar only to the sexual genera *Neuroterus* (*Ameristus*, Förster) and *Dolichostrophus*, Ashmead. The third joint of the antennæ is not quite as long as joints 1 and 2 or 3 and 4 united, joints 10-13 a little longer than thick, while the last joint is fusiform, a little longer than the penultimate. The scutellum has a depression across its base, but is without distinct foveæ, and is also not separated from the base of the mesonotum by a delicate grooved line; apically it is obtusely rounded, shagreened and somewhat densely pubescent. The mesopleura have a large, rather deep vertical femoral impression. The wings are represented by very short pads which do not extend beyond the apex of the metathorax or just reach to base of abdomen. The abdomen is about twice as long as the head and thorax united, polished, bare; the second segment dorsally occupies about half the whole surface; the third segment dorsally is not quite as long as segments 4 and 5 united; the segments 4-7 subequal; while the hypopygium terminates in a long, pubescent spine. The hind tarsi are as long as their tibiæ, the claws being simple.

Xystoteras volutella, sp. n.

Gall.—A conical, bluish-gray gall, from 3 to 3.5 mm. high, by 2.5 mm. in diameter at base; occurring singly or in great numbers on the under surface of the leaves of *Quercus macrocarpa* in Riley County, Kansas. The top of the gall is truncate and internally it is hollow, with the larval cell or kernel, resembling a minute nipple, situated at its base. The gall is attached to the leaf by a few fibres and may easily be detached. The colour of the gall is produced by a powdery or pruinose bloom which completely covers it when fresh.

Gall-wasp.—♀. Length 2 mm. Polished black, very sparsely pubescent. Antennæ 14-jointed, about two-thirds the length of the body, the first joint or scape obconical, slightly curved, swollen at tip, the second joint about $1\frac{1}{2}$ times as long as thick, both much stouter than the flagellum. Mesopleura smooth, shining, with a deep vertical femoral fovea. Legs, except knees or the extreme apices of the femora, which are dull honey-yellow, entirely black.

Hab.—Manhattan, Riley County, Kansas.

Described from a single specimen received nearly ten years ago from Mr. C. L. Marlatt. The wasp, according to Mr. Marlatt, issues from the gall early in January.

ZOPHEROTERAS, gen. nov.

This genus also comes very close to *Philonix*, Fitch, but is readily separated from it by the shape of the scutellum, by antennal characters, by bareness of abdomen, and by the claws of the hind tarsi being simple, not toothed.

The frons and mesonotum are alutaceous or feebly shagreened, the latter having distinct traces of the parapsidal furrows, or at least these are more or less distinct posteriorly. The scutellum is rounded or semi-circular, rounded off posteriorly and separated from the mesonotum by a delicate grooved line and carina. The antennæ are long, 14-jointed, the third joint as long or nearly as long as joints 4 and 5 united; joints 6–13 are a little more than twice as long as thick. Claws of hind tarsi simple. The abdomen is longer than the head and thorax united, bare, or at the most with only some sparse pubescence at sides towards the base; the second segment dorsally occupies fully half the whole surface; segments 3–5 short, subequal; segments 6 and 7 very short; while the hypopygium is armed with a hairy spine.

To this genus belongs *Acraspis vaccinii*, Ashm.

XANTHOTERAS, gen. nov.

Head shagreened, the frons without a distinct ridge or carina between the antennæ. Mesonotum polished, with deep, distinct parapsidal furrows. Scutellum with more or less distinct lateral margins or with a frenum, two indistinct shallow foveæ at base and the same separated from the base of the mesonotum by a delicate but distinct transverse grooved line and a carina. Antennæ 14-jointed, the third joint a little longer than the fourth, or the latter about two-thirds the length of the third; joints

7-14 a little stouter than joints 2 to 6, and much shorter, joints 11-13 being hardly longer than wide. Tarsi shorter than their tibiae, the claws with a tooth within.

This genus, although closely allied to *Biorrhiza*, Westw., is readily separated by the absence of the middle frontal ridge between the antennae, by the shape of the scutellum and by the claws having a tooth within.

The type of the genus is *Biorrhiza forticornis*, Walsh.

PARATERAS, gen. nov.

Last joint of labial palpi somewhat enlarged, ovate. Antennae 14-jointed, the third joint long, but much shorter than joints 4-5 united, joints 11-13 scarcely twice as long as thick, the last joint hardly so long as the two preceding united. Head and thorax alutaceous or finely shagreened, the mesopleura finely delicately sculptured, without a femoral fovea. Mesonotum with two distinct parapsidal furrows which converge and meet at base of the scutellum. Scutellum small, highly convex or elevated, with a distinct transverse fovea at base (in reality two foveae united). The hind tarsi are longer than their tibiae, the claws with a distinct tooth at base beneath. Abdomen polished, bare. This genus comes nearest to *Sphaeroterus*, Ashm., but is readily separated by having 14-jointed, not 13-jointed, antennae, by the scutellum having a fovea or foveae at base, and by the hind tarsi being longer, not shorter, than their tibiae.

Parateras Hubbardi, sp. n.

Agamous ♀.—Length 2 mm. Head and thorax reddish-brown, the vertex and scutellum somewhat obfuscated. Abdomen black, piceous towards base. Antennae with the first two joints ferruginous, dusky above, the flagellum black or brown-black, except first joint basally. Legs, including coxae, pale ferruginous, with all the tibiae, or at least outwardly, dark fuscous or blackish, the tarsi more or less fuscous. Abdomen with the second segment not quite occupying half the whole surface, the third segment dorsally not quite as long as four and five united, the fifth about two-thirds the length of the fourth, the following segments retracted.

Hab.—Detroit, Michigan.

Described from two specimens received from Mr. H. G. Hubbard, to whom the species is dedicated.

ASCLEPIADIPHILA, gen. nov.

This new genus comes very close to *Antistrophus*, Walsh, and might easily be confused with it, since it agrees with it in all particulars except as follows:

The female antennæ are 13-jointed, not 14-jointed, the third joint being shorter than the fourth; in the male the antennæ are 14-jointed, not 15-jointed. The second abdominal segment occupies fully two-thirds the whole surface, while in *Antistrophus* the second segment is considerably shorter.

Asclepiadiphila stephanotidis, sp. n.

Gall.—A small, rounded or pea-like gall averaging from 6 to 8 mm. in diameter, growing from the stems of a species of *Stephanotis*. Externally it is opaque and varies from a gray to a brownish colour, while internally it is whitish and composed of a dense pithy substance with a single larval cell in the centre.

Gall-wasp.—♀. Length 3 mm. Head, thorax and legs reddish-brown, the sutures of the thorax dusky, the mesonotum with a dark streak down the middle, while the middle and hind tarsi are more or less obfuscated. Antennæ 13-jointed, brown. Abdomen black, highly polished. Wings hyaline, the veins pale yellowish; the first branch of the radius is straight or nearly so; areolet entirely wanting, the transverse cubitus about two-thirds the length of the first abscissa of the radius, the first branch of the cubitus very delicate, indistinct, and originating from about the basal third of the basal nervure.

♂.—Length 2.6 mm. Black; tips of femora and more or less of anterior and middle tibiæ basally dark honey-yellow, rest of legs black. Antennæ 14-jointed, the scape and pedicel black, the flagellum brown.

Hab.—Oregon, Missouri.

Types, No. 3737, U. S. N. M.

A NEW FOOD PLANT FOR PAPILIO ASTERIAS.

BY G. H. FRENCH, CARBONDALE, ILL.

A few days ago I received a letter from Mr. A. V. Thomsen, Chicago, giving a new food plant for *Papilio Asterias*. But I can give it best by quoting part of Mr. Thomsen's letter. He says:

"Having made a very interesting observation in my study of Lepidoptera, I herewith enclose the notes regarding the same. Aug. 26, '97, I received from Mr. Higgins, in charge of Dept. of Hardy Perennials

and Wild Flowers, Lincoln Park, four larvæ of *Papilio Asterias*, nearly full-fed. Found on *Ruta Graveolens* (English Rue). These larvæ pupated as follows: One on Sept. 4, three on Sept. 7. On Sept. 13, '97, I received from the same source eight larvæ of *P. Asterias* in third, fourth and full-fed stages. One pupated Sept. 16. Two of these were found on *Ruta Graveolens*, the balance on *Foeniculum officinale* (common Fennel). Now, I have never seen nor heard of any previous records of *P. Asterias* being found on anything else than members of the Umbelliferae, and I consider it a very strange occurrence that they should choose a family so widely separated from the Umbelliferae as the Rutaceae, of which *Ruta Graveolens* is the type.

"If it had been *Papilio Cresphontes* which I had found upon that plant I should not have wondered, as its food plants here are *Xanthoxylum* and *Ptelea*, two of the Rutaceae, but *P. Asterias*!"

I should like to ask here if any one has found *Papilio Philenor* feeding on anything but *Aristolochia*? The species of this genus are rare here, but the butterfly is rather common.

ANOTHER NEW SPECIES OF PROTANDRENA, CKILL.

BY S. N. DUNNING, HARTFORD, CONN.

Protandrena Bancrofti, n. sp.

♀.—Length 9-11 mm.; not as stout as *Cockerelli*, Dun.; a few gray hairs on face and cheeks and on under side of thorax, hair bands on segs. 2-3-4, seg. 5-6 covered with hair growing rufous towards tip, legs and venter with sparse rather longer hairs; black except a T-shaped mark resting against upper edge of clypeus, spot on tegulae, tubercles, and four anterior knees which are pale yellow. Head subquadrate, broader than high, venter with fairly deep, not close, punctures; clypeal and sub-clypeal punctures larger and shallow, mandibles piceous; antennae black at base, growing brownish towards tip, 1st jt. flagellum not as long as 2nd and 3rd combined. Mesothorax deeply and closely punctured; scutellum with large, coarse punctures; post-scutellum not smooth, shining; metathorax with a smooth, shining spot on upper lateral angles, closely and finely punctured, a narrow suture extending upwards. Abdomen finely and closely punctured; venter with large shallow punctures. Wings subhyaline, much darkened outwardly (very much more so than in *Cockerelli*); stigma and nervures ferruginous, a light spot before the stigma.

Two specimens (D. 1102, July 6, 1897, on *Solanum rostratum*; D. 1262, July 11, '97, on *Medicago sativa*, or alfalfa) taken on the Bancroft Farm, near Denver, Colo. One has been deposited with the American Entomological Society.

SOME NEW AND LITTLE-KNOWN COCCIDÆ COLLECTED
BY PROF. C. H. T. TOWNSEND IN MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

The Coccidæ herein described were collected by Prof. Townsend in 1896, and kindly transmitted to me for study by Dr. L. O. Howard. The collection made by Prof. Townsend will be fully enumerated in a paper to be published by him elsewhere, so the present contribution is confined to descriptions of the new species and descriptive notes on one hitherto imperfectly known. I have also included the description of a new variety of *Comstockiella* from Mexico, not found by Townsend.

(1.) *Aspidiotus reniformis*, n. sp.—♀ scale circular, diam. 2 mm., flat, pale reddish-brown; exuviae concolorous or slightly darker, covered, but both skins very distinctly visible, large, laterad of the middle. First skin when rubbed shining coppery.

♀.—Reniform, yellow with a brown margin; the posterior portion large, pale yellow, projecting with the outline of a cone, unusually produced and narrow, the sides meeting at less than a right angle. Pygidium (so-called) minutely striate; anal orifice oval or subtriangular, a long distance from hind end. Four very small low broad inconspicuous lobes, the plates between them scarcely visible; these lobes are twice as broad as long, the second about or nearly as broad as the first. Immediately cephalad of the second lobe comes a pair of small diverging spinelike plates; then after an interval somewhat greater (sometimes less) than the distance from the hind end to the plates just mentioned, comes a depression in which is a larger, but still small, pair of diverging spinelike plates; beyond this the margin is distinctly but very minutely serrate, with three small pointed prominences at rather long intervals, and a small rounded notch about half way between the first of these and the largest plates.

There are long tubular glands opening at the bases of the lobes, and also at the place of the obsolete third lobe; these are three on each side, with others, shorter and smaller, between them. Caudolateral grouped glands a long distance cephalad of the anal orifice. Four groups of ventral glands, caudolaterals 4 to 7, cephalolaterals 8. The antennæ are represented by small tubercles, each emitting a bristle. On each side of the mouth, some distance from it, is a small reniform orifice, its convexity directed laterad.

Hab.—Numerous on under sides of entire, lanceolate leaves, about 60 mm. long. Tehuantepec City, Mexico, May 26th (Townsend; Div.

Ent., No. 7196). This is related to the subgenus *Chrysomphalus*, and comes nearest to *A. perseæ*, Comstock. It resembles *A. mimosæ* in some respects, but the tubular glands are much longer than in that species, or in *smilacis*. The scale might be taken, at a superficial glance, for *amantii*, *dictyospermi*, or one of the *uvæ* group, all of which are quite different structurally.

(2.) *Aspidiotus (Hemiberlesia) tricolor*, n. sp.—♀ scales $1\frac{2}{3}$ mm. diam., crowded on twig, approximately circular, very little convex, white with a brownish stain; exuviae central or sublateral, covered by a film of secretion, appearing as a blackish spot; first skin in many examples uncovered, black or dark brown; second skin rarely uncovered, deep orange. Removed from the twigs, the scales leave a whitish film, quite conspicuous.

♀.—Circular, orange-brown. Only a single pair of lobes, these very large, entire, broad and low, much broader than long, gently rounded at ends, shaped like the end of an axe-blade; separated by a pair of well-developed spinelike plates. On the margin cephalad of the lobes is a group of five more or less serrate spinelike plates; then come three very short spinelike plates, after which the margin is more or less, irregularly, crenate. Anal orifice large, oval, distant from bases of median lobes less (sometimes a little more) than its own length. No groups of ventral glands. A few oval glands marking the lines of the obsolete segments. Two small saccular incisions with thickened edges on each side, one immediately laterad of the median lobe, the other cephalad (or laterad) of the obsolete second lobe.

Hab.—Salina Cruz, Mexico, May 29th (Townsend: Div. Ent., No. 7193). Distinguished by its very broad entire lobes, and the orange second skin. It will form with *A. rapax*, Comstock, and *A. ulmi*, W. G. Johnson, a little group, to which the name *Aspidites* is applicable, thus:

Subg. *Aspidites*, Berlese and Leonardi, 1896, s. str.—Scale white or whitish, no groups of ventral glands, only one pair of lobes.

Exuviae black or at least very dark..... *rapax*.

First skin black or very dark, second orange..... *tricolor*.

Exuviae wholly orange-yellow..... *ulmi*.

A. rapax is the type of *Aspidites*. *A. perniciosus*, *tenebricosus* and *smilacis*, included in it by Berlese and Leonardi, are not closely related to *rapax*, and should be placed elsewhere. [Since writing the above I have

found that *Aspidites* was proposed by Waagen in 1895 for a genus of Cephalopoda; *Aspidites*, Berl. & Leon., may therefore be changed to *Hemibertesia*.]

(3.) *Diaspis persimilis*, n. sp.—♀ scale about $1\frac{1}{2}$ mm. diam., snow white, slightly convex; exuviae sublateral, brownish-orange, first skin wholly on second. ♂ scale unknown.

♀.—Circular, orange-brown, hind end strongly striate. Five groups of ventral glands, median 25 or more, nearly touching cephalolateral, cephalolateral about 15, caudolateral 7 to 12. Anal orifice small, caudad of caudolateral glands, but some distance from hind end. Only one pair of distinct lobes, these rounded, not particularly large, very slightly inclined to be crenate on edges, nearly touching at base; at outer base of each lobe a spine; then a spinelike plate, the branching tips of which slightly exceed the lobe; then a pair of minute tubercles representing the second lobe, then a spine; then a very large and stout spinelike plate, branched at tip; then three minute tubercles, then a spine; then a spine-like plate resembling the second but not quite so stout; then a slight notch, followed by a minute tubercle, then on the margin at intervals twelve ordinary spinelike plates of moderate size, and a few spines. At the bases of the median lobes are short dark sacs, a pair to each; and smaller sacs mark the places of the obsolete lobes on the margin. The oval and elongate glands in rows marking the obsolete segments are comparatively few in number.

Hab.—Crowded on fruit of "Chico Sapote," Laguna, Carmen I., Mexico, April 24, 1896. (Townsend: Div. Ent., No. 7184.) Very near to *D. amygdali* (*lanatus*); it may be recognized by the small number of orifices in the caudolateral groups of glands, the form of the lobes, and other minor details.

(4.) *Comstockiella sabalis*, v. *mexicana*, v. nov.—♀ oval, orange-yellow. Grouped glands as follows: Caudolaterals 14-17 (6-10 in type); mediolaterals 11-15 (4-7 in type); cephalolaterals 7-10 (4 in type). Scale as in type.

Hab.—On palms which arrived at San Francisco from Mexico; found by Mr. Craw, who thinks the palms came from near Maratlan, and were growing wild about 75 or 100 miles inland. The genus is new to the Mexican fauna.

(5.) *Lecanium* (*Eulecanium*) *perditum*, n. sp.—♀. Long. 3, lat. 2 to $2\frac{1}{4}$, alt. $1\frac{1}{2}$ mm., general shape low-conical or hemispherical; very

dark brown, more or less shiny; sides with linear plications. Boiled in caustic soda turns the liquid yellowish-brown. Antennæ pale, well-developed, tapering, ordinary, 7-jointed, formula 32 (17) 5 (46); 3 extremely long, considerably longer than 4 to 7 together; 2 about as long as 4 + 5; a faint false joint marks the basal $\frac{1}{4}$ of 3; 1, 2 and 3 each with a pair of bristles, on 1 and 2 about the middle, on 3 near the end; 7 with several hairs, an especially long one, longer than itself, springing from its base. Rostral loop short. Anal plates yellowish-brown, the caudolateral margin somewhat shorter than the cephalolateral. Legs well-developed, pale. Digitules filiform, with large knobs. Tarsus hardly half length of tibia. Derm not reticulated, with sparse small round or oval gland orifices; a broad marginal area with very large round or oval gland-pits, the derm between them exhibiting a faint tendency to minute reticulation. These large gland-pits are double or more often complex; they are often nearer together than the diameter of one.

Embryonic larva (after boiling) pale yellowish-brown; rostral filaments in two coils. Caudal tubercles not or little projecting beyond body margin, though well-developed. Anal ring with six hairs, its broad margin conspicuously striate. Claw long; digitules of claw filiform, distinctly knobbed, extending beyond tip of claw; tarsal digitules stouter, with very distinct knobs, not nearly twice as long as claw-digitules, their origin some distance basad of base of claw.

Hab.—Xcolak, near Izamal, Yucatan, Mexico, March 10th, 1896. (Townsend: Div. Ent., No. 5663.) This is a most interesting species; the first *Eulecanium* ever found in the tropics. The antennæ are like those of *L. antennatum*, Signoret. The compound submarginal glands or pits remind one of the large double glands of *L. Fletcheri*. On the other hand, the large pits of the neotropical species *L. baccharidis* (from Brazil) and *L. batata* (from Antigua) are at once suggested, and it seems that we have here an indication of the affinities of these two species, which had been heretofore wholly obscure. *L. perditum* presents some superficial resemblance to small examples of *L. depressum* or *begoniae*, but these belong to a quite different section.

(6.) *Lecanium chilaspidis*, n. sp.—♀ very dark brown, shiny, but largely encrusted (especially at sides) with a dull dark grayish substance; strongly convex, long. $8\frac{1}{2}$, lat. 6, alt. 5 mm. Beneath, at the lateral (spiracular) incisions, are conspicuous patches of white secretion, only

visible after detaching the scale. Younger specimens are flatter, long. 6, lat. 4, alt. 2 mm. There is no waxy secretion on the surface.

♀.—Boiled in soda stains the liquid dark Vandyke-brown. No legs or antennæ found; probably they are rudimentary and easily deciduous. Anal plates small, pinkish-brown, together forming about a square. Derm pale reddish-brown after boiling, not reticulated, remarkable for an immense number of minute gland orifices, among which are interspersed a lesser number of larger, but still small, glands, which are circular and brown in colour. There are also large brownish patches. In places the tubular ducts of the minute glands are darkened, giving the derm a bristly appearance. The derm may be compared to the sky seen through a telescope, the minute glands being the fixed stars, the larger the planets, and the patches the nebulae, though of course the sky does not exhibit so many planets or nebulae.

Embryonic larva (after boiling) very pale pink, with very well-developed, stout, cylindrical caudal tubercles, which are the forerunners of the anal plates; each emits the usual long bristle, but these are easily broken off. Tarsus hardly or not over $\frac{2}{3}$ length of tibia, femur and tibia approximately of equal length. Digitules all filiform, the tarsal ones very long, twice as long as those of claw, and longer than the tarsus itself. Rostral loop extending considerably beyond the hindmost legs. Anal ring with apparently only six bristles. Last joint of antennæ long.

Hab.—On *Chilaspis linearis*, Tehuantepec City, Mexico, May 26th, 1896. (Townsend: Div. Ent., No. 7216.) On the *Chilaspis* at the same time and place were also taken species of *Aspidiotus* and *Mytilaspis*, but the material is inadequate for proper study. *L. chilaspidis* is a very distinct species, but more nearly allied to other neotropical forms than to anything else.

(7.) *Lecaniodiaspis* (*Prosopophora*) *radiatus*, n. sp.—♀. Long. 3, lat. 2 mm., often rounder, to long. $2\frac{2}{3}$, lat. $2\frac{1}{4}$ mm., more or less shiny, flattish, pale ochreous, with a longitudinal median keel, low but distinct, and well-defined radiating ribs, marking the segments. Removed from the bark, the scale leaves a whitish mark. Boiled in soda, it turns the liquid greenish. Antennæ pale brownish, apparently 8-jointed, but the joints obscure; 8 short, buttonlike; 3 longest, then 4, or these two about equal; 2 broader than long; 5 and 6 might be taken for one long joint, fully as long as 3; 7 very little smaller than 6. Dermis with numerous very small figure-of-8 glands, which under a low power look like

simple oval glands. Mouth-parts large, yellowish. Dermis not minutely wrinkled. Antennal formula (34) (12567) 8. 8 with some bristles, one longer than itself.

Hab.—On bark of branch of some woody plant, Salina Cruz, Mexico, May 29, 1896. (Townsend: Div. Ent., No. 7194.) *L. radiatus* is much more depressed than *quercus*, not marked like *dendrobii*, rounder than *acaciæ*, differently coloured from *eucalypti*, darker, rounder and smaller than *rufescens*, darker and more distinctly radiately ribbed than *yuccæ*. It seems to be very near to *Lecaniodiaspis atherospermæ* (Maskell), by its small size, 8-jointed antennæ, and very minute figure-of-8 orifices; yet it differs in some particulars, and is, I believe, not the same. *L. atherospermæ* is from Australia, but it may not be a native of that country. Mr. Maskell himself remarks that it is more like the neotropical *dendrobii* than the other Australian members of the genus.

(8.) *Conchaspis Newsteadii*, n. sp.—♀ scales crowded on the bark, overlapping; subcircular to oval, dirty white, low conical, diam. $2\frac{1}{2}$ mm. Apex sublateral, no radiating ridges.

♀ oval, orange-brown, similar to *C. angræci* in most respects. Antennæ 6-jointed, joints subequal, variable. Femur longer than tibio-tarsus, coxa about twice as broad as long. The round gland orifices with crenate edges (so strongly crenate as to appear moniliform) are very distinct; the hindmost segment that shows them is the fourth from the end, this has a pair, close together, on each side. The next segment has on each side four close together, one a little mesad of these, then two at considerable intervals mesad. The next has on each side five in an irregular row, and two pairs at considerable intervals mesad. The next has five and one mesad. The details of the arrangement will differ on the two sides of the same specimen. Long marginal hairs as usual in the genus. Lobes at end of body indistinct.

♂ scale similar to that of the ♀ in texture, but small and elongate.

♂ Pupa red-brown, antennæ stout, of about 7 joints, reaching beyond base of the large rounded wing-pads; end of abdomen with a short, stout caudal stylus, blunt at tip; on each side of the last abdominal segment, by the base of the stylus, are three bristles, two very small, one longer.

Hab.—On Zuchil tree (*Plumieria*), Vera Cruz, Mexico, Feb. 26th. (Townsend: Div. Ent., No. 7159.) I take the liberty of connecting with this insect the name of Mr. R. Newstead, who, under the name of

Pseudinglisia, has given us the best account of *Conchaspis* yet published. With Mr. Green's Ceylon *C. socialis*, this will make the third species of the genus so far discovered. The ♂ pupa, now described, is very interesting, as it is just like the pupa of a Diaspid.

(9.) *Llaveia axinus* (de la Llave).—Prof. Townsend found at Salina Cruz, on May 27th, specimens of a large monophlelid, which I believe is identical with the imperfectly described *Ll. axinus*. The specimens are red, with mealy powder, and are sparsely marked with small black spots; dried specimens appear more grayish, and look something like very large *Coccus cacti*. The legs and antennæ are red-brown, the inner side of tibia and tarsus presents a row of short spines, about 11 on anterior tibia, and six, very small, on anterior tarsus. There are two rows of longer spines on the under side of the femur. Dermis rather thickly beset with short hairs. The largest specimen sent to me is perhaps not adult, and has only nine-jointed antennæ. Its dimensions are, long. 13 mm., lat. $6\frac{1}{2}$, alt. $4\frac{1}{2}$ mm. It appears, however, that adults were certainly found by Townsend, as among the material received at Washington were both eggs and young larvæ. Dr. Howard has kindly lent me a mounted larva, from which I have made the following description:

Larva oval, bright red, beset with short, rather stout spines. Seven very long hairs on each side of hindmost half of body, one to each segment, each accompanied by a much shorter and more slender hair, the smaller hair on the penultimate segment longer than its representatives on those anterior to it, and about half as long as the long hair of the same segment. The long hairs of the caudal segment accompanied by two smaller hairs, of which the innermost are the longest. Legs long, femora moderately stout, those of front legs about as long as tibia, of hind legs shorter than tibia. Tibia and tarsus very slender; tarsus of front legs equal with tibia, of middle legs a little shorter, of hind legs conspicuously shorter than tibia. Claw long, little curved. Eyes very dark, subconical. Antennæ 6-jointed, last joint or club very large, much swollen, longer than 4 + 5, with three whorls of hairs. Second joint a little longer than third, 3 and 4 equal, 5 shortest. The joints from 1 to 4 might be called subequal, and the formula then written 6(2134)5.

I am inclined to suppose that *Llaveia* and *Ortonia* will prove to be the same genus, differing at any rate not more than do species now included under *Icerya*.

EARLY STAGES OF BREPHOS INFANS.

BY DWIGHT BRAINERD, MONTREAL.

Eggs laid April 25th, side by side, packed closely together on the twig at fork of leaf bud. The moth standing head downwards with half opened wings and "see-sawing" out a string of from three to twelve eggs. Between times it runs all over the twig as do the Tineids. Egg oblong, rounded at both ends, length .87 mm., width .46 mm. Slightly roughened and punctured like the skin of an orange. Colour at first a delicate pea-green turning yellowish. The number deposited at the base of each leaf varied considerably. Hatched May 3rd to 5th. At birth larva 1.6 mm., semi-transparent, light sap-green with evanescent purple shades. Body cylindrical, of same approximate size throughout, ending in a strongly bifurcate anal segment. Head light yellow-brown; 1st and 2nd epicranial and 1st clypeal setæ rudimentary, the remaining eleven primary setæ well-developed blunt bristles. Ocelli prominent, dark brown. Shield concolorous. True legs transparent, with dark claws; 4th prolegs fleshy, rimmed with brown; the others not showing.

Segments 3-wrinkled, tubercles uniform on the abdominal joints; a pair each side of dorsal line, a single one above, a pair below spiracles and one above leg plate. Caterpillar a semi-looper, suspending itself by a thread.

Second stage.—3.75 mm. Colour whitish-green, head yellow. Inter-segmental spaces white and much swollen.

Third stage.—Length 12 mm. Sap-green changing to apple-green. Head and appendages, except claws, transparent. Body marked with a double ad-dorsal and a stigmatal white line.

Fourth stage.—Length 30 mm. Colour on dorsum apple-green to blue-green, according to age. Head appendages and venter much lighter; almost yellowish. Tubercles simple, white, oval to round; setæ short and spinulate. Ad-dorsal line wavy, obscure, slightly broken. There is a narrow double white line through abdominal segments on lateral surface enclosing a darker area; and stigmatal band is broad, white to yellow-white. Spiracles red-brown edged with black, set in indistinct white blotches. Body cylindrical, tapering from 12th segment. Pupated June 12th. Food plant white birch. Pupa green at formation, changing to dark chestnut-brown. 14 x 4 mm., smooth. Extremities short, rounded; medial portion cylindrical, of equi-width; the whole cocoon approximately oval. Prothorax strongly incised dorsally and pitted. Frontal headpiece convex, hyaline. Maxillæ reach nearly and antennæ fully to extremity of wing-covers. (4th a. s.) Abdominal segments slightly indented down the back. Cremaster with a single stout hook.

Mr. H. H. Lyman kindly measured the eggs, and I had the advantage of Rev. Mr. Fyles's notes on the caterpillar.

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NOTES ON GRAPTA INTERROGATIONIS, FABR.

BY H. H. LYMAN AND A. F. WINN, MONTREAL.

This species was unusually abundant in this, as in many other localities, during the season of 1896, and afforded an excellent opportunity for studying it, which we took advantage of by rearing it from the egg. The preparatory stages are well known, and a full account of the life history was given by Mr. W. H. Edwards in CAN. ENT. XIV., pp. 201-207. As noted by Mr. Edwards, the larvæ vary greatly, and this is true even in those raised from the same batch of eggs, and these variations seem to be in no way connected with the two forms of the imago.

In Mr. Caulfield's List of Diurnal Lepidoptera of the Island of Montreal, published in the CAN. ENT. in 1875, this species is called "rare," and its seasons are stated to be "May (hibernated); July to October."

The question as to the number of broods in the season is an interesting one and requires careful examination, but the majority of the authorities are not very clear upon this subject.

Dr. J. G. Morris made no attempt in his "Synopsis" to deal with seasons or broods.

Dr. Harris is not very clear, as he says that the butterfly "first appears in May and again in August and September," and that "the caterpillars come to their full growth in the latter part of August." From these statements it would seem as if he only recognized one annual brood, the individuals of which hibernated and appeared again in the spring; but he says further that "there is probably an early brood of caterpillars in June or July," though he had not seen any on the hop vines before August, but from his remarks on the duration of the pupa stage, viz., "the chrysalis state usually lasts from eleven to fourteen days, but the later broods are more tardy in their transformations, the butterfly sometimes not appearing in less than 26 days after the change to the chrysalis," would seem to indicate that he recognized more than two broods.

Dr. Packard in his "Guide" says of the butterfly: "It is found in May, August, and Autumn," which would not indicate more than two broods.

Mr. W. H. Edwards, who bred this species repeatedly at Coalburgh, says in the CAN. ENT., X., 71, and XIV., 204, that in West Virginia "there are three broods and a more or less successful effort for a fourth." "In Florida," he says, "there are at least four broods, and probably five," but that "in the Northern States, and probably in Canada, it is two-brooded."

Prof. Fernald in "Butterflies of Maine" says nothing of the number of broods, but mentions the dimorphic forms, so he must have recognized that there were at least two broods.

Mr. Scudder in his "Butterflies of New England" says it is double-brooded, the first brood in descent from the hibernators appearing in July, sometimes during the last days of June, and continuing into August, the second brood beginning to emerge towards the end of August and continuing to do so until at least the middle of October.

In regard to the dates at which the hibernators appear in this latitude, Mr. Winn records in his notes April 25, 1890; April 14, 1892; April 9, 1894; and found it quite common in New Brunswick the first week in May in 1896, the specimens seen there being of the form *Fabricii*. A few *Fabricii* were seen around Montreal during the latter half of May, but no particular attention was paid to them; but on the 6th June our Montreal Branch joined the Natural History Society in its annual field day, but separated from the party at Ste. Adele, at which point a number of *Interrogationis* were seen, and two were taken by one of our members, but both were of the form *Umbrosa*, though worn, and either hibernators or, perhaps, colonists from the South.

In this connection reference may be made to the experience of Mr. W. F. Fiske, of Mast Yard, N. H., as written to Mr. Lyman, and since then published in the CAN. ENT., XXIX., 26. In this case no specimens of *Interrogationis* were seen till the middle of May, when a badly worn *Umbrosa* was observed, and during the rest of the month this form was common, but no *Fabricii* were seen, and this certainly suggests the idea that these individuals were colonists from the South.

On 13th June our Branch had a little excursion to the Blue Bonnets Swamp, about half way to Lachine, and several *Umbrosa* were seen and

taken. Most of these were worn, but Mr. Winn saw a fresh specimen, and others were seen and one secured on the 14th.

These were evidently individuals of the first brood in descent from hibernators or colonists, and assuming that the eggs were laid during the first week of May, would allow about six weeks from egg to imago, which corresponds with the experience of Mr. Edwards with the first brood in West Virginia, which took 37 days—28th April to 4th June.

On 14th June Mr. Winn also observed two very much worn *Fabricii* ovipositing on the young leaves of an elm. This late laying of eggs causes the broods to overlap and makes it almost impossible to tell to what generation any captured specimen belongs.

From the 15th to the end of June *Umbrosa* was quite common, but no more *Fabricii* were seen. On 24th a number of larvæ, apparently not more than a day old and quite close to the empty egg-shells, were found, and on 25th about 40 eggs and seven young larvæ were found on a bunch of elm leaves plucked at random. These produced the imagos between 19th and 29th July and were 31 *Umbrosa* and two *Fabricii*, and were doubtless part of the second brood of the season.

On 1st July Mr. Lyman took at Lachine a ♀ *Umbrosa* and confined it over leaves of elm, but no eggs were laid for over a week.

On 12th July the butterfly was found to be dead, but had laid 101 eggs, some almost ready to hatch and some just recently laid.

The eggs began hatching that same evening and others continued to hatch during the 13th and 14th. Some of the earliest to hatch passed first moult on the 15th, the third day from the egg. The first chrysalis was formed on 5th Aug., and the first imago emerged on 13th Aug., giving a pupal period of eight days, a period from hatching of egg to imago of 32 days, and a probable period from oviposition to imago of 35, or, at the outside, 36 days.

Some, of course, took a few days longer than this, but all had emerged by the 21st August. Of nearly 60 butterflies which emerged, not more than five were *Fabricii*, all the others being *Umbrosa*.

Now it seems clear that the parent butterfly which was taken on 1st July, but would not lay till 8th or 9th, must have belonged to the first brood in descent from the hibernators or colonists, whichever the early ones were, and that the brood thus reared represented the second brood, and there would be abundance of time after the 21st August for a third brood to mature. That such a third brood must exist is practically

proved by the fact that the second brood as raised by us was almost entirely composed of the form *Umbrosa*, while it is well known that *Fabricii* largely predominates in the autumn, which would not be the case if there were no third brood.

On 26th July, while Mr. Winn's second brood was emerging, he confined a ♀ *Umbrosa* on elm and obtained eggs the same day, which hatched on 30th. Others were caged on 28th and five more on 2nd Aug., on hop, and many eggs were obtained. Some were left on the food plant, but the others were taken on a holiday trip to Metis, Q., the last hatching 7th Aug. On Aug. 24th the first chrysalis was formed, and imago emerged 4th Sept. and proved to be *Fabricii*, but at the same time a number of the larvæ were just past the third moult. While at Metis the larvæ were fed on hop, as elm trees were not found, and when brought back to Montreal were again fed on elm.

Either from this change of diet or from the colder climate of the lower St. Lawrence, the majority of this brood were greatly retarded and emerged at intervals all through September, and one as late as 18th Oct. Of nineteen individuals seventeen were *Fabricii* and two *Umbrosa*.

One fresh *Umbrosa* was also seen on 16th Sept., and *Fabricii* was common on the fine days of the early part of that month.

This makes the third brood, with a varying preparatory life duration of 40 to 77 days.

With Mr. Edwards the period of the third brood varied from 31 to probably over 50 days.

In nature the oviposition of the various broods would doubtless be extended over a longer time and the emergence of the imago similarly spread out, but when a species can go through all its changes in from 31 to 36 days it stands to reason that there must be at least three broods in the season in this latitude.

The third brood must certainly hibernate, and Mr. Winn found that those flying in September did not seem inclined to lay eggs, and careful search failed to produce a single one.

In CAN. ENT., X., p. 72, Mr. Edwards states his belief that the scarcity of hibernators in the spring compared with the abundance of the species in the summer is due to the existence of the species being dependent on the partial fourth brood, which he considers the only one that hibernates, and states that the species does not suffer from parasites to any extent.

This statement, published in April, 1878, is strikingly at variance with his former notes upon this species in part 9 of Butt. N. A., I., issued in January, 1872, pages 117-118 of the volume, where, after recounting the large number of enemies which prey upon it, he says, "It is doubtful if much more than two per cent. of the eggs laid produce butterflies."

Mr. Winn collected early in September from off the fence over which his hop vine grew 32 chrysalids, being the result of the eggs laid 3rd and 4th August, which he had left upon the vine. From these only two butterflies emerged, both on 18th September, and, curiously enough, one was a ♂ *Umbrosa* and the other a ♀ *Fabricii*. All the others were attacked by parasites, which Mr. W. H. Harrington determined as *Pteromalus puparum*, Linn.

The following notes upon the eggs were made by Mr. Lyman :

In regard to the colour, number of ribs, etc., of the eggs, there is considerable divergence among the authorities.

In regard to the colour, Scudder, quoting Riley, says that at first they are dull bluish-green, afterwards becoming grayish-green with silvery reflection. Edwards and Fernald call them "pale green," and this I consider correct, as I could see no trace of blue-green about them. Edwards says that the eggs have eight or nine vertical ribs, and is followed by Fernald. Edwards also says that the eggs laid in strings have always the same number of ribs, and hence Scudder deduces the theory that individual butterflies always lay eggs of the same number of ribs, but the latter author gives the number of ribs as "nine to eleven, commonly ten."

Of the 101 eggs laid by my butterfly in confinement, 24 were laid on the leaves, 3 being above and 21 below, and the rest, except 2, on the gauze.

There were ten strings of two, four strings of three, one pyramid formed of two below and one above, and another formed by one standing upright upon one on its side, and sixty-four singles. Some of the strings were very irregular, and some had apparently been laid at different times.

Of 52 eggs examined, 31 had 9 ribs and 21 had 10. One of 9 ribs, with larva nearly ready to hatch, had a green newly laid egg with 10 ribs on top of it.

In striking contrast to its abundance in 1896, only one specimen of this butterfly was seen during the season of 1897 by Mr. Winn.

NEW SPECIES OF CHIONASPIS.

BY R. A. COOLEY, B. S., AMHERST, MASS.

At the request of Prof. T. D. A. Cockerell, through correspondence with Prof. Fernald, I was induced to take up the study of the genus *Chionaspis*, and Prof. Lull the genus *Pulvinaria*. Prof. Fernald prepared and sent out a circular letter to all entomologists whose addresses could be obtained, in this and other countries, and personal letters were also sent to the leading coccidologists, asking for as many species as possible to aid in the preparation of monographs of these two genera. The result has been most gratifying, for already a very large amount of material has been received.

In the material before me the following new species of *Chionaspis* have been found, and are published now in preference to waiting till the monograph is issued. The studies on these insects are being made in Prof. Fernald's entomological laboratory connected with the Massachusetts Agricultural College, where every possible facility is afforded for breeding and studying insects, together with very complete literature of the subject.

Chionaspis Cockerelli, n. sp.

Scale of female.—The female scale is about 3.2 mm. long, straight or very slightly curved, moderately thick in texture, slightly convex, white, with the exuviae pale yellowish-brown, the second skin being covered with secretion.

Female.—The pygidium is distinctly notched at the end, the sides of the notch being formed by the divergent median lobes. These lobes are firmly united at the base and have serrate edges. Two distinct parallel spines arising from the bottom of the notch are about as long as the distance between the inner edges of the lobes at the base. Compared with the other lobes of the pygidium the median ones are larger and extend farther into the body. Each lobe of the second pair is composed of two well rounded and distinct lobules, the incision between them extending to the base of the lobe. The inner lobule is larger and extends posteriorly about even with the median lobes. The third pair of lobes may be present or aborted; when present they are broad and low, with an elongated pore anterior to the base of each. Between the median and second pair is a minute spine, followed by a plate which is about as long as the second pair of lobes, and following these is a conical projection bearing a marginal pore. Outside of the second lobe is a spine, a plate

and a marginal pore, this plate being a little larger than the first one. Following the third lobe, when it is present, or a space when it is absent, there are two spines, one above and one below. These are followed by a plate and a distinct marginal pore, and after an interval interrupted by one or two spines, another plate, and following this another interval, terminated by a group of about three plates.

The spinnerets are in five groups: median, 7-9; anterior laterals, 17-23; posterior laterals, 23-34.

Described from dead and shrunken specimens.

Scale of male.—Length, 1.2 mm.; feebly carinated, white, with the larval skin almost colourless.

Described from a single imperfect specimen.

Male.—Male insect unknown.

The specimens were taken by Mr. Alexander Crow, on palm imported from China to San Francisco, Cal., July 11, 1897.

I take pleasure in naming this insect after Prof. T. D. A. Cockerell, who has made extensive and valuable contributions to our knowledge of the Coccidæ, and has shown me many kindnesses in my work on this group of insects.

Chionaspis aucubæ, n. sp.

Scale of female.—The female scale somewhat resembles that of *Chionaspis Lintneri* in outline, being strongly broadened posteriorly and abruptly rounded at the extremity. It is moderately convex, about 3 mm. in length and about 2 mm. in width. The exuviae at the apex of the scale have the first skin very pale yellow, and the second yellowish or brownish. The second skin is covered with a slight secretion. The scale itself is white and very thick and strong. There is a partial ventral scale at the anterior end.

Female.—As I had only dead and dry specimens of this insect, I made no attempt to describe anything but the pygidium of the female. Median lobes moderate in size, divergent, united at the base, with their inner edges distinctly serrate. Each lobe of the second pair is composed of two rounded lobules, the incision between the two reaching nearly or quite to the base of the lobe. The inner lobule is larger and projects farther posteriorly than the outer, sometimes surpassing the median lobes. The third lobe is simple and sometimes rudimentary. Between the bases of the median lobes is a pair of minute convergent spines. On each side between the median and second lobes are a spine, a plate and a marginal

pore, and between the second and third lobes two spines, one above and one below, followed first by one or two plates, and then by a conical projection bearing a marginal pore. Outside of the third lobe are a spine and from one to three plates, then a slight notch, immediately followed by a marginal pore and after a space two unequal spines and about three plates. Following these plates are a notch and a marginal pore, then after a space a group of about five plates.

Spinnerets arranged in five groups: median, 8-14; anterior laterals, 19-28; posterior laterals, 19-33.

Scale of male.—The male scales are much more numerous than those of the female. They are white, delicate in texture, about 1.2 mm. in length, the larval skin at the anterior end being colourless or slightly yellowish. The scale itself may be parallel sided or slightly broadened posteriorly, and is indistinctly carinated.

Male.—Male insect unknown.

On Aucuba from Japan. Discovered by Mr. Craw in the course of his quarantine work at San Francisco. The scales are grouped together on one side of the leaf beneath, and the edge of the leaf is folded under, almost completely hiding them from view.

Chionaspis wistariæ, n. sp.

Scale of female.—The female scale is about 2 mm. in length, though some specimens are slightly longer, moderately broadened, dirty white in colour and delicate in texture, being a close imitation of the epidermis of the bark on which it rests. The scales usually occur in the longitudinal cracks of the bark, and are partially concealed under the epidermis. They are very often pressed out of the normal form. The exuviae are brownish, and the second skin is covered with secretion.

Female.—The following description of the female was made from dead and shriveled insects. The median pair of lobes is large and conspicuous, the second pair considerably smaller, and the third pair obsolete. The median lobes are darker in colour than any other part of the pygidium, firmly joined at the base, their inner edges parallel and nearly touching each other for about half their length, then diverging at about a right angle, with the exposed edges serrate. The second lobe is composed of two lobules, the inner one being the larger. Within the outer edge of each of the median lobes is a spine, and next to this a short blunt plate, followed by a marginal pore. Between the lobules of the second lobe is a spine, and outside of the second lobe are a plate and

two marginal pores, followed first by a spine and then by a plate, which is about as long as the median lobes, and often forked at the tip. Outside of this plate are two marginal pores, followed by a spine and one or two plates, then after another marginal pore a group of about four plates.

There are five groups of spinnerets: median, 8-15; anterior laterals, 19-31; posterior laterals, 13-23.

Scale of male.—The male scale, as in all other species of this genus, is elongated in form and white in colour. The sides are nearly parallel, and it is distinctly tri-carinated. Length, about 1 mm. The larval skin resembles the anterior or smaller one of the female scale.

Male.—Male insect unknown.

Discovered by Mr. Craw, July 8, 1897, at San Francisco, on the bark of Wistaria from Japan.

Chionaspis pinifoliae heterophyllæ, n var.

Scale of female.—The scale of the female is indistinguishable from that of *pinifoliae*, Fitch, having the same range of form and size, the colour of the scale and exuviae being the same. The scales vary in size from 2 mm. to 3.4 mm., the average length being about 2.5 mm. The scale is white, strongly convex, with the exuviae at the anterior extremity yellow, both skins being naked.

Female.—The description of the female is made from dead and shriveled specimens. At the anterior end of the body are two distinct, curved bristles, which may be the rudiments of the antennæ; these are found also in *pinifoliae*. The last segment terminates in a median notch, the sides of which are formed by the divergent median lobes. The lobes of the second pair are low and inconspicuous, and each one is composed of two lobules of about equal size. Two minute spines, one above and one below, arise from near each median lobe, though back from the edge of the segment. Contiguous to each median lobe is a simple plate, outside of which is a marginal pore. Between the lobules of the second lobe is a distinct spine, and outside of this lobe is a plate with a spine at its base, followed by a marginal pore. Outside of the rudimentary third lobe is a marginal pore, followed by a spine and a plate with a spine at its base. Then follows a pronounced marginal pore, a short interval, another space and a long interval, interrupted only by a spine, and terminated by the fourth and last plate.

There are five groups of spinnerets: median, 4-8; anterior laterals, 12-18; posterior laterals, 14-16. The chief characters by which *pinifoliae*

and the variety can be separated are the presence of the median notch in the variety and the larger size and more rounded form of the lobes in *pinifoliae*.

Scale of male.—The male scale cannot be distinguished from that of *pinifoliae*. It is slightly more than 1 mm. long and .4 mm. wide at the posterior end, where it attains its greatest width. The scale is white, with a moderately distinct median carina. The larval skin is like the first one of the female.

Male.—Male insect unknown.

On Cuban pine, *Pinus heterophylla*, from Florida. I am indebted to Prof. A. L. Quaintance for a bountiful supply of specimens, as well as to Prof. Cockerell, who first called my attention to this insect and sent me specimens.

The scales are found chiefly at the bases of the very long, slender leaves, and mostly on the inner surface. A few specimens occur also on the stems of the new growth. There were circular openings in a few of the female scales, from which parasites had emerged.

The following original description, which has never been published, was sent to me by Prof. Cockerell to be added to this paper :

Chionaspis latissima, Ckll.

C. latissima, Ckll., Calif. Fruit Grower, June 5, 1897, pp. 4-5. (Descriptive note ; no full description.)

"Female scale circular, 2 mm. diam., white, semitransparent, with the light ocreous exuviae to one side, first skin half overlapping second, second skin oval. Eggs shining, pale pink.

"♂ scale linear, white, with a very feeble median keel.

"♀ when boiled in caustic soda turns yellow, marbled and suffused with bright blue-green ; the mouth-parts remain a warm brown. Under pressure the ♀ becomes greatly elongated. Anal orifice level with the lower (caudad) edge of the cephalolateral glands. Five groups of ventral glands, median of 8, cephalolaterals of 18, caudolaterals of 20. Lateral dorsal rows of elongated pores. General characters of *chinensis*, *nyssæ*, etc. Differs from *chinensis* by the median lobes being not or barely brownish, and being decidedly produced, and the second and third lobes each represented by three distinct lobules. The lobes are much more produced than in *nyssæ*. The spinelike plates are large. The scale is very similar to *vitis*, Green, but is smaller than that of *varicosa*, Green.

"On under sides of leaves of *Distylium racemosum*, from Japan, found by Mr. Alex. Craw, April, 1897, in the course of his quarantine work at San Francisco."

PREPARATORY STAGES OF PYRUS TESSELLATA, SCUD.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .02 inch. Blunt conical, height about the same as the diameter; ridged with about 30 longitudinal striæ, with shallower cross striæ. Colour pale green. Duration of this period six days.

Young Larvæ.—Length, .08 inch; cylindrical; head somewhat cordate, two-thirds the width of the body; the anterior part of joint 2 about one-half the diameter of the head, the posterior part as wide as joint 3; each joint back of 2 with four low transverse folds besides the very narrow fold at each end of the joint. Colour pale greenish with a white sheen; piliferous spots concolorous; hairs erect, forked to about the middle, the forks curving back towards the body anteriorly and posteriorly. These are the hairs from the piliferous spots. Hairs on the body black, hairs on the head and joint 2 white and not furcate. Head jet black; joint 2 pale yellow-brown with a black transverse bar just back of the middle of the joint; dark along the sides; thoracic feet black. There are eight hairs in pairs on the dorsal bar of joint 2. Duration of this period two or three days.

After first Moults.—Length, .15 inch. Shape not materially changed. Head and joint 2 jet black; hairs all white, shorter than before, more numerous, the end capitate instead of bifid; head and neck corrugated. Duration of this period six days.

After second Moults.—Length, .40 inch. Marked as before; hairs still capitate, white; a dorsal and subdorsal line a little more plainly green; head and joint 2 profusely hairy, but the hairs are all short, surface corrugated. Previous to this moult the larvæ mostly lay coiled on the surface of the food plant, but now they straighten out under a thin silky covering. Duration of this period four days.

After third Moults.—Length, .50 inch. Cylindrical, head about the same width as the body; black, covered with white hairs, each of which has about six short side spurs from about the middle up; joint 2 black, with the dorsal bar red-brown with a whitish margin; hairs on this joint of two kinds, short and long, the long about one-sixth the width of the body in length and very shallowly trifid at the end; body, each joint with five folds, the anterior twice the width of the others; two forms of hairs, one very short and the other long, each long one about the length of those on joint 2 and arising from a white conical base, trifid at the outer end; the short ones arising from a shorter cone and capitate at

the end. Colour of the body pale yellowish-green, a more distinct dorsal and subdorsal stripe and the subdorsal space with mottlings of darker green; stigmata sordid white. Duration of this period four days.

After fourth Moul.—Length, .85 to .95 inch. About the same as during preceding period, but the head hairs have a brown tinge, and joint 2 is brown, with a whitish dorsal line, and sometimes subdorsal also. Duration of this period seven days.

Pupa.—Length, .55 inch; diameter, .15 inch. Nearly cylindrical; from the head to the posterior part of the wing-cases .37 inch, these extending nearly to the posterior edge of joint 5; body pretty well covered with short, simple, white hairs; head rounded, eyes rather prominent, a prominent tuft of hairs between them (frontal hairs they might be called), another anterior tuft on the inner edge of margin of eye, more on the outer margin, while the space around the eye between these tufts is without hairs. Colour gray; head gray with a greenish tinge except on the eye-space; dorsal part of thorax gray with a slight green tinge, three transverse rows of small black spots, the first, one on each side, subdorsal; the second row six, one each side of a very slight green dorsal line and one on each side of what would be a subdorsal line if such were present, a little anterior to the others; third row six, one on each side of the dorsal line and one outside and a little anterior to this and one on the shoulder of hind wings. Spiracle just back of the eye large, elevated, dark or Vandyke brown, the outer portion pale. Wing-cases green, ribbed as usual, mottled slightly in two shades, but not strongly contrasting; abdomen with each joint gray (the gray of the whole pupa a more sordid white with a gray tint, as there is none of the dark gray about it), slightly green tinted, the incisures more distinctly pale green, each joint with its row of small black spots across the middle, supplemented back of the row with a less perfect row of smaller spots, the first row of six spots, of which the outer spot on each end of the row is the black spiracle; cremaster brown, elongated hooks at the end that fasten into a thin, loose button of silk. Duration of this period eight days.

The larvæ, when ready to pupate, folded a leaf together and loosely fastened it with silk, but there was no lining of silk except a small, thin button to which the cremaster was attached.

The eggs were sent me by Dr. C. Hoeg, of Decorah, Iowa. At first he sent me two eggs under date of July 31st, 1897, that he had found on

Malva rotundifolia. These did not hatch on account of injury in transit, and under date of August 6th he sent me fifteen more, found on the same plant. These hatched out August 12th. I fed them first on a species of *Abutilon*, but as they did not take to that readily, though eating it a little, I changed to *Althea rosea*. I think they will eat any of the rough-leaved *Malvaceæ* readily. On account of being away from home part of the time, the larvæ were somewhat neglected in the last stages, but notwithstanding this two passed through all their stages, producing the first imago September 12, 1897.

THREE INTERESTING STAPHYLINIDÆ FROM QUEEN CHARLOTTE ISLANDS.

BY REV. J. H. KEEN, MASSETT, B. C.

At the request of Dr. James Fletcher, I am writing a few notes to accompany the three figures which have been made at his instance, and kindly presented by him. They represent three *Staphylinidæ* taken by me at Massett, on the Queen Charlotte Islands, and were prepared under the direction of Mons. A. Fauvel, the well-known specialist in that order, to whom also I am indebted for the determination of the beetles themselves. *Haida Keeni*, Fauvel. New gen. and new sp. (Fig. 34.)

For this interesting little *Homalium*, M. Fauvel found it necessary to construct a new genus, and his description will be given in full as soon as it comes to hand. The beetle is of a dark reddish-brown colour, much brighter on the elytra, which have a broad transverse band of black posteriorly. It varies a good deal in size and also in the depth of its coloration. It is found throughout the year, but is most abundant in September, when it frequents rotten leaves on the ground, and seems to have a preference for elder leaves. In winter it occurs in moss about the roots of spruce and other trees. It is somewhat sluggish in its movements and feigns death for a minute or more on being disturbed. I have not yet succeeded in taking it on the mainland, though it is fairly common at Massett.



FIG. 34.

Liparocephalus brevipennis, Mökl. (Fig. 35.)

This submarine species is very abundant on the shores of the Q. C. Islands and not uncommon on the mainland opposite, though until I

took specimens of it at Massett it was known only, Dr. Fletcher says, by the type specimen at Washington. The insects are found crawling over barnacle-covered stones and boulders near low-water mark. Occasionally they occur congregated in a mass of several hundreds under a single stone, but for what purpose I have been unable to discover. It is most abundant in autumn.

From some experiments I made with several specimens in a dish of salt water in which was a half-submerged stone, I observed that they cannot swim under water, but merely crawl on the stones, their pubescence enabling them to surround themselves with minute bubbles of air. They could not be induced to enter the water from the top of the stone. If forced to leave the stone they would swim on the surface, but seemed incapable of diving. If touched while on the side of the stone under water, however, they feigned death, and had the power of sinking readily to the bottom. Some that were left all night swimming on the surface of the water were found dead in the morning, while others which had been submerged all night were still active.



FIG. 35.

A question has been raised as to whether *L. cordicollis*, Lec. (exactly similar to the present species in form, but with the head and thorax brown), is anything more than a colour variety. I have watched both with this point in view, and speaking merely as a field observer, my belief is that they are separate species. *L. cordicollis* is the rarer of the two, but when it occurs it is in little colonies. I know, for instance, one large boulder where almost at any time I could take fifty specimens of *cordicollis*, but where I have never yet seen *brevipennis*. I have, moreover, never seen one of each *in coitu*, though pairs of one or the other are commonly met with. I may add that my view seems to receive slight confirmation from the fact that three other species of submarine beetles occur at Massett with black abdomen and limbs, but with brown head and thorax. On the other hand, however, I have noticed that the brown of *cordicollis* darkens considerably with keeping.

Tanyrhinus singularis, Mann. (Fig. 36.)

This curious insect seems to be rare in collections, for neither Mons. Fauvel nor the late Dr. Hamilton possessed a specimen till they received



FIG. 36.

one from me. Mr. L. O. Howard, however, tells me he has a good series in the National Museum at Washington. It is by no means common at Massett, for I have only taken nine in seven years, and never more than three in one year. It has occurred always in the same spot—on the under side of a rotten spruce log on the ground. From positions I have taken it in I conclude that it feeds either on the rotten wood or on minute fungoid growths on the wood. On one occasion I obtained two specimens by pouring water into the log, which is now soft and fibrous with age, when they emerged from holes. The insect is slow and deliberate in its movements, and makes no attempt to fly when disturbed. It has occurred only in early spring; several of my specimens were taken in the middle of February when snow was on the ground.

ON THE GENERIC POSITION OF SOME BEES HITHERTO REFERRED TO PANURGUS AND CALLIOPSIS.

BY T. D. A. COCKERELL, MESILLA, N. MEX.

Having lately received from Mr. Friese, of Innsbruck, a number of European bees, I have been led to re-examine certain of our species, in order to determine their relationship to a number of old-world genera not supposed to occur in America. The result is extremely interesting, and seems to show that we have for many years been placing bees in genera to which they by no means belong. The following table may be used provisionally to separate the genera under discussion*:

A. Tongue more or less short and broad, tapering at the end. (*Andreninæ*).

1. Basal nervure nearly or quite straight.
 - a. Three submarginal cells..... *Andrena*, Fabr.
 - b. Two submarginal cells..... *Parandrena*, Rob.
2. Basal nervure strongly bent.
 - a. Three submarginal cells..... *Halictus*, Latr.
 - b. Two submarginal cells..... *Hemihalictus*, Ckll.

*Mr. Friese sends me also four examples of *Nomioides pulchellus*, Schenck, taken at Pest on the second of June. This bee is a *Perdita* with the venation of an *Halictus*! It is curious to see all the ornaments, sculpture, etc., of *Perdita*, with a long tapering marginal cell and three submarginals. It is evident from this, and from the absence of *Perdita* in the American tropics, that our genus is of boreal origin, not austral, as I formerly thought.

B. Tongue narrow and more or less elongated, usually quite long.
(Panurginae).

1. Marginal cell produced, tapering to a point, not appendiculate.
 - a. Body *Colletes*-shaped, abdomen with hair-bands, *Rhophites*, Spin.
 - b. Body *Halictus*-shaped, abdomen without well-formed hair-bands..... *Halictoides*, Nyl.
2. Marginal cell truncate at tip, usually appendiculate.
 - a. Body *Colletes*-shaped, abdomen usually with hair-bands..... *Calliopsis*, Sm.
 - b. Body *Halictus*-shaped, abdomen without well-formed hair-bands..... *Panurginus*, Nyl.

The genera under B have but two submarginal cells; those under A all have a marginal tapering to a point. I give the subfamilies as I find them, but it seems at least probable that the form of the tongue is an adaptive character, not to be relied upon for separating groups higher than genera. The Panurginae, notwithstanding the tongue, appear to be certainly Andrenidae.

Parandrena.

The type is *P. andrenoides*, a spring-flying species. The smaller stigma of the autumnal "*Panurgus*" *pectidis*, *rhodocercatus* and *oliviae* is paralleled in *Andrena* by that of *A. pulchella*, also an autumnal insect. For the present I would place the three species of "*Panurgus*" named in *Parandrena*, with the reservation that they may hereafter need to be separated from it. They are much nearer to *Rhophites* than to *Panurgus*.

Hemihalictus.

The type is *H. lustrans*, described as *Panurgus*. This looks not unlike the European *Halictoides*, but differs in the tongue, which in *Halictoides* is very narrow, and by the strongly bent basal nervure and the third discoidal cell considerably narrowed above.

Rhophites.

Mr. Friese sends me *R. quinquespinosus*, Spin., and *R. canus*, Ev. These are what we should call *Panurgus*, and if there are in our fauna any "*Panurgus*" with the pointed marginal cell, of fairly robust shape, with abdominal hair-bands, these will belong to *Rhophites*, provided they have the narrow elongated tongue which separates them from *Parandrena*. The stigma of *Rhophites* is small, as in the autumnal species provisionally referred above to *Parandrena*.

Halictoides.

Many authors have confused this with *Rophites*, but it is fairly distinct. I have before me the following species:

H. paradoxus, Moraw.—Innsbruck, July 15th; Sept. 13th, at *Euphrasia*. Coll. Friese.

H. dentiventris, Nyl.—Andermatt, July 9th; "Weissnfls," Aug. 3rd; Sept. 2nd, at *Campanula*. Coll. Friese.

H. inermis, Nyl.—"Weissnfls," July 13th, at *Campanula*. Coll. Friese.

H. marginatus (Cress., as *Panurgus*).—My New Mexico insect has stood as *halictulus*, Cr., but according to Robertson that is identical with *marginatus*. It flies in August and September.

H. campanulæ, n. sp.—♂. Length, 9 to 10 mm. Black, shiny; pubescence sparse; pale cinereous, mixed with black, on head and thorax; black, with a little cinereous, on abdomen and legs. Hair on inner side of tarsi shining orange-fulvous. Head large, very broad, a little broader than thorax, subquadrate, facial quadrangle very much broader than long, anterior edge of clypeus with a hoary fringe, clypeus and front appearing rough from very close punctures, mandibles with a well-formed inner tooth, antennæ crenulate, flagellum feebly tinged with ferruginous beneath; mesothorax shiny, with distinct, rather close punctures; enclosure of metathorax coarsely rugose; tegulæ piceous, with a hyaline band; wings smoky, nervures and stigma piceous, first recurrent nervure joining second submarginal cell considerably nearer its base than the second recurrent to its apex; second to fourth joints of hind tarsi broadened, triangular; abdomen shining, the surface appearing silky, hardly punctured; no hair- or colour-bands; sides of segments towards apex with tufts of black hair; apex conspicuously tufted with more or less shining sooty hair; a large tuft of sooty or black hair also arises from the sixth ventral segment, and is very conspicuous when the insect is viewed from the side. Tongue narrow.

Hab.—Four from Olympia, Washington State, June 30; all at flowers of *Campanula scouleri*. (T. Kincaid, coll.)

How many more of our so-called *Panurgus* will be found to belong to *Halictoides* I do not know, but it is probable that an examination of the types will show that we have at least as many *Halictoides* (six) as are known from the other side of the world.

Panurgus.

Taschenberg ("Die Gattungen der Bienen") separates *Panurgus* from *Rhophites* by its *truncate, appendiculate, marginal cell*. Three European species, now before me, all exhibit this character, which is generic. It therefore follows that none of the so-called *Panurgus* of Cresson's 1887 Catalogue belong to that genus. So far as known, we have no typical *Panurgus* in North America; two *Panurgus*-like forms may be referred to a new group, thus:

Pseudopanurgus, n. g.

Type *Ps. aethiops* (Cr., as *Panurgus*). Includes also *Ps. fraterculus* (Ckll., as *Calliopsis*). Black, nearly naked, strongly punctured, wings fuliginous, marginal cell distinctly but obliquely truncate at tip, two submarginals, *first recurrent nerve joining second submarginal cell no great distance before its middle, second recurrent joining it just before its tip, basal process of labrum large, subquadrate*. In some respects this seems to resemble Provancher's *Chelynia* (which I have not seen), but it is surely not the same thing.

Panurginus.

Mr. Friese sends me *P. montanus*, Gir., collected at Airolo, Andermatt, and Innsbruck. It flies at the end of June and beginning of July; one specimen is marked as from *Ranunculus*. The clypeus is yellow in the ♂, dark in ♀. To this genus belong *Panurginus clypeatus* (Cr.), *bidentis* (Ckll.), *margaritensis* (Fox), *compositarum* (Rob.), *albitarsis* (Cr.), *ornatipes* (Cr.), *rudbeckiae* (Rob.), etc., all now referred in our lists to *Calliopsis*. The European *P. montanus* has the venation of our *P. clypeatus*.

Calliopsis.

This name can be retained for such species as *C. andreniformis*, *coloradensis*, *obscurus*, etc. There also remain some forms which must be left in *Calliopsis* until a better place is found for them, although they seem scarcely congeneric with *andreniformis*.

DR. HARRISON G. DYAR has removed from New York to Washington, D. C., where he has accepted the position of Honorary Curator of Lepidoptera in the United States National Museum.

MR. ARTHUR J. SNYDER, of Evanston, Ill., has recently been appointed Principal of the North Belvidere Schools. His address is now 521 East Madison street, Belvidere, Ill.

A LIST OF MANITOBA MOTHS.

BY A. W. HANHAM, WINNIPEG, MAN.

The following list of Manitoba species, it is hoped, will prove of interest to readers of the CANADIAN ENTOMOLOGIST:

With a few exceptions, the records are from my own observations and captures. The list covers the work or collecting of three whole seasons and the latter half of a fourth; and it is to a great extent a local one, very little collecting having been done outside of the Winnipeg district.

Last season (1896), in July, and again this year, in August, I was fortunate in being able to visit Brandon, Man.—some 130 miles west of Winnipeg—where, especially during my first visit in July, I enjoyed some very successful collecting, and I am thus enabled to add a considerable number of things to my list, many of them very desirable species.

I believe a comparison of collections made at Brandon and at Winnipeg would show some striking differences, many of the Western forms occurring at Brandon not reaching so far east as Winnipeg. This district embraces some open "rolling" prairie, a good deal of swampy land covered with willow and other bushes, plenty of thick "bush" containing no trees of any size, a little fine timber, mostly elm, along the river "bottoms," and a gravel ridge many miles in extent, more or less wooded, with some sandy tracts, commencing at Bird's Hill, some eight miles from this city.

The last described locality much resembles the general run of country around Brandon, and after Elm Park, situated in a bend of the Red River, about three miles out of Winnipeg, is much the richest collecting ground within the district. The Province of Manitoba contains numerous lakes, some of vast area, as Lakes Winnipeg and Manitoba; none, however, come within this district, nor have any yet been visited.

The list of Sphingidæ is but a meagre one, and I think hardly representative of the district; certainly not of Manitoba as a whole. Nearly fifty per cent. of the Bombycidæ recorded were added this year, and they were, without exception, taken "at light," at the end of June and during July. But for this my list in these too would have been equally poor.

Mr. E. F. Heath, who lives near Cartwright, in Southern Manitoba—a much better country than this, I believe, for the entomologist—could, I feel sure, supplement these records.

Most of the Bombycidae have been submitted to Dr. H. G. Dyar, to whom I am under special obligations for his generosity in returning nearly everything sent to him (a large proportion being “uniques”). The Sesiidae were very kindly determined for me by Mr. Beutenmüller, through Dr. Dyar. I have also received welcome assistance from both Dr. James Fletcher and the Rev. C. J. S. Bethune.

Hemaris thysbe, *Fabr.*, var. *ruficaudis*, *Kirby*.—In 1894 (June 17th) several were seen hovering over the blossoms of the Wild Pea, but only one was secured. Later a number were noticed (dead) in the windows of some empty shops.

Met with again this season.

Hemaris tenuis, *Grt.*—On April 19th (1897) a pupa was found in the soil under a log along the railway line at Brandon. The moth evolved on May 18th.

Deilephila gallii, *Rott.*, var. *chamænerii*, *Harr.*—In the collection of Mr. H. W. O. Boger, of Brandon.

Deilephila lineata, *Fabr.*—Mr. Boger reported this moth as being very abundant, on the wing, on August 25th (1896), in a market garden at Brandon, in the evening, as many as 20 or 30 being visible at the same time. It occurred here about the same date. On August 5th (1894), quite early in the afternoon, and in the bright sunshine, I noticed a *Deilephila* on the wing over some thistles on the prairie, but I failed to net it.

Sphinx drupiferarum, *S. & A.*—At Brandon (1897), by Mr. Boger.

Sphinx luscitiosa, *Cram.*—On July 1st (1895) I found a ♀ at rest under the loose bark of a fence post, and on June 11th (1896) a fresh ♂ was found “sitting” on a sidewalk in the heart of the city.

Sphinx chersis, *Hbn.*—July, one in a shop window, also at Brandon, in Mr. Boger's collection.

Sphinx albescens, *Tepper.*—July 1st, one at light; another taken at Rounthwaite, Man., by Mr. L. E. Marmont.

Ceratomia undulosa, *Walk.*—July 8th, one at light.

Smerinthus geminatus, Say.—Common at light, June 27th to July 10th. Only previous records, one at rest on a tree in Elm Park, June (1894), and July 2nd (1896) one in a spider's web on a fence near the same locality. It had, without doubt, furnished a sumptuous repast, or several.

Paonias excrucatus, S. & A.—At light, June 27th and July 1st. Four specimens.

Paonias myops, S. & A.—An example in Mr. Boger's collection was taken at Prince Albert, N.-W.T. This species is likely to occur in Manitoba.

Cressonia juglandis, S. & A.—One at light, July 1st.

Albuna pyramidalis, Barnst.—One, July 8th (1896), Bird's Hill.

Sesia rubrofascia, Hy. Edw.—One, June 17th (1894).

Sesia albicornis, Hy. Edw.—Several, June 15th and 24th and July 13th.

Sesia sp.—July 26th, Brandon. One specimen spoilt in net, too rubbed to be determined.

All these Sesiidæ were taken when sweeping low herbage and flowers for Coleoptera, chiefly along railway tracks.

Alypia Langtonii, Coup.—Several at Rounthwaite, by Mr. Marmont.

Scepsis fulvicollis, Hbn.—One at light, middle of July.

Sarrothripa Lintneriana, Speyer.—My first records, Sept. 1st and 13th, etc., show it to be a late species; but as I took it this year in July, at light, it may prove to be double-brooded. One of those captured is a very handsome variety.

Argyrophyes cilicoides, Grt.—According to Dr. Dyar, this is a rare species; it occurred at light from July 2nd to 20th.

Clemensia albata, Pack.—July 27th, etc., several at rest on trees in Elm Park, and one in the city.

Crambidia pallida, Pack.—A pupa found under a stone at Bird's Hill on July 21st (1895) produced the imago on Aug. 6th. Common this season at light, middle of July.

Crambidia casta, Sanb. (No. 988, Smith's List)—A pair evolved on Aug. 4th (1896). The larvæ were common under stones at Bird's Hill

on July 7th and 8th, and a number were boxed. A day or two later during or after a journey to Brandon, most of them escaped from my jar. These larvæ were small "woolly-bears," hairs dark brown. I think they were full-grown. Dr. Dyar states that the larva of this moth has never been described, so I regret not having made some notes on its appearance. A pair, having twice the expanse and somewhat lighter secondaries, were captured on the wing at dusk, on an open hillside at Brandon, on Aug. 27th this year.

Hypoprepia fucosa, *Hbn.* (*miniata*, *Kirby*)—One at light on July 10th (1896) at Brandon.

Euphanessa mendica, *Walk.*—July 3rd, etc., common in Elm Park.

Crocota ferruginosa, *Walk.*—One at Brandon, July 15th (1896).

Crocota immaculata, *Reak.*—Several July 15th, 21st, etc., at Bird's Hill, and on the prairies flying during the day. Very common this season during July at light. Pupæ found under boards, etc., on June 20th and July 1st.

Crocota quinaria, *Grt.*—Several in Elm Park and dark woods, July 3rd, etc., flying during the day; this species did not come to light.

Callimorpha clymene, *Brown.*

" *Lecontei*, *Ebv.*

" " *var. militaris*, *Harr.*

" *vestalis*, *Pack.*—One specimen only—a beauty.

All these *Callimorpha* were taken in Elm Park on July 1st and 3rd (1896).

Platartia hyperborea, *Curt.* (*parthenos*, *Harr.*)—A specimen of this beautiful moth was captured this season at Brandon by Mr. Boger.

Arctia virgo, *Linn.*—Common this season at light, July 3rd to middle of month. Previous records: July 15th (1895) an imago hiding at the roots of weeds in my garden; a pupa found on July 1st, produced moth on 13th of month; a larva taken under a log on April 22nd (1894), produced the imago on July 3rd.

Arctia Saundersii, *Grt.*—Common at light, middle to end of July. One under a stone in gravel pit at Brandon on July 31st (1896).

Arctia virguncula, *Kirby.*—One at Rounthwaite, in Mr. Marmont's collection.

An Arctian in poor condition taken this year at Brandon, by Mr. Boger, may be *phalerata*, *Harr.*

Pyrrharcia isabella, S. & A.—Larvæ seen in 1894; moth not taken here.

Spilosoma virginica, Fabr.—This moth appears to be rare here; it did not come to light. A moth was taken July 26th (1895), and some larvæ were seen on Aug. 25th, and several pupæ were found this spring at Brandon.

Spilosoma prima, Slosson.—A moth evolved on May 9th (1897) from pupa found at Brandon in April.

Spilosoma antigone, Strk.—Several, Aug. 25th, etc.

Hyphantria cunea, Dru.—Several, June (1894).

Euchætes collaris, Fitch.—One at Brandon this season by Mr. Boger.

Halisidota maculata, Harr.—One, at light, July 1st. (This specimen differs considerably from my Hamilton, Ontario, examples.)

Orgyia antiqua, Linn.—One, Aug. 15th (1895), at rest on a window in the city.

Orgyia leucostigma, S. & A.—Common at light, middle to end of July, and examples taken (also at light) on Sept. 24th and 28th.

Parorgyia Clintonii, G. & R.—On July 23rd (1895) I found two cocoons of this species in the folds of an old newspaper in some open woods. A moth evolved from one about Aug. 1st. The other produced several handsome ichneumons.

Parorgyia plagiata, Walk.—Common at light, middle to end of July.

Tortricidia testacea, Pack.—Pairs by beating, June 10th and 14th (1894). Specimens taken at light, end of June and beginning of July, this year were all poor.

Ichthyura vau, Fitch.—Several, at light, middle to end of July.

Ichthyura albospigma, Fitch.—Common at light from July 9th to end of month.

Ichthyura Brucei, Hy. Edw.—One or two, at light, about 20th of July.

Datana ministra, Dru.—One, at light, July 2nd.

Nadata gibbosa, S. & A.—Several, at light, June 27th to July 6th.

Gluphisia trilineata, Pack.—Common at light during July.

Notodonta elegans, Strk. (No. 1273, Smith's List)—Four specimens at light, June 27th to July 2nd.

Lophodonta angulosa, S. & A.—A pair at light, beginning of July.
Macrurocampa Dorothea, Dyar.—One at light, beginning of July.
This species was described and figured on page 176 of Vol. XXVIII. of the CANADIAN ENTOMOLOGIST. Dr. Dyar states that my capture is only the second known specimen of this new species, and that it differs from the type in being darker and more heavily marked with yellow.

Pheosia dimidiata, H.-S. (*rimosa*, Pack.)—A pair at light, one on June 27th, the other on July 26th.

Edema albifrons, S. & A.—Several, at light, at the end of June.

Seirodonta bilineata, Pack.—July 8th (1894), one on a fence in the city.

Dasylophia anguina, S. & A.—One or two at light early in July.

Schizura ipomææ, Doub.

“ var. *cinereofrons*, Pack.

Both these forms sparingly at light, July 2nd to 25th. But one specimen (*cinereofrons*) taken before in the district. July 14th (1895), at rest on a fence.

Schizura eximia, Grt. (No. 1300, Smith's List)—Several, at light, early in July.

Schizura badia, Pack. (No. 1302, Smith's List)—Taken at light from the end of June until nearly the end of July, but not common.

Schizura unicornis, S. & A.—Three at light early in July.

Ianassa lignicolor, Walk.—July 19th, three at light.

Cerura occidentalis, Lint.—New to me this season; took one at rest on side of house the first week in June; examples came to light on June 27th, July 15th, 18th and 19th.

Cerura cinerea, Walk.—One at light, middle of July.

Dryopteris rosea, Walk.—Common at light from July 3rd to end of month. On June 23rd (1894) one taken in Elm Park, at rest on a leaf. Not seen again until this season.

Dryopteris irrorata, Pack.—Two, at light, July 6th and 8th.

Attacus cecropia, Linn.—A specimen has been bred from the larva by Mr. Criddle, near Douglas, Man.

Attacus columbia, Smith.—Recorded by Mr. E. F. Heath from Cartwright, and Mr. Marmont from Rounthwaite. Dr. Fletcher says that the food plant in the Northwest is *Elceagnus argentea*.

Actias Luna, *Linn.*.—The Rev. W. Burman, of this city, reports the capture of a specimen in Elm Park, and last season in the same place I picked up a cocoon, most likely belonging to this species; it contained the decayed remains of the larva.

Telea polyphemus, *Cram.*.—Winnipeg and Brandon, at light in June.

Anisota virginiana, *Dru.*.—Recorded from Miami, Man., by Dr. Fletcher. The larvæ causing damage to oak trees.

Clisiocampa fragilis, *Stretch.*.—July 10th (1896) and later at Brandon; several at light and on fences. Also this season at Winnipeg, at light, in July.

Clisiocampa americana, *Harr.*.—A moth evolved on July 15th (1896) from full-grown larva taken on June 20th. Several at light this season in July.

Clisiocampa disstria, *Hbn.*.—One, at light, towards end of July.

Phyllodesma americana, *Harr.* (No. 1414 Smith's List)—One, at light, on July 1st.

Hepialus argenteomaculatus, *Harr.*.—This moth appeared to be abundant here in 1895. I took specimens on the wing in my garden about dusk on July 11th, 15th and 17th; they were all hovering (a most peculiar flight they have) over some high weeds. Specimens were taken at rest on July 13th and June 30th (1896). On the first mentioned occasion the moth was holding on to a tall stalk of grass within a yard or so of a railway track.

This is a very variable insect, no two of those captured agreeing in colour or markings. Mr. Marmont has one, taken at Rounthwaite, which is nearly white. The records of captures at light, where the year is not given, are all for 1897.

(To be continued.)

The readers of this magazine will deeply sympathize with PROFESSOR H. F. WICKHAM, of the State University of Iowa, who has found himself compelled, in consequence of serious trouble with his eyes, to give up the study of Entomology. He is now disposing of his splendid collection of North American Coleoptera. This is a rare opportunity for Entomologists to complete their representatives of various families of beetles. That his eyes may ere long be restored to their normal condition is the earnest wish of all his friends.

BOOK NOTICES.

THE BOOK OF BRITISH BUTTERFLIES.—A practical manual for Collectors and Naturalists: 1 vol., pp. 247. (3s. 6d.)

THE BOOK OF BRITISH HAWK-MOTHS.—A popular and practical Handbook for Lepidopterists: 1 vol., pp. 157. (3s. 6d.) By W. J. Lucas, B. A. London: L. Upcott Gill, 170 Strand, W. C.

Many excellent works on British Butterflies have been published during the last twenty-five years, and one would naturally suppose that there was little need of another book on the subject. Mr. Lucas, however, has succeeded in producing a very useful and excellent popular manual, which will be a welcome aid to those who wish to study the life-history of butterflies as well as to identify the specimens they may collect in the British Isles. As it is intended for those who have made no previous study of the subject, the author begins at the beginning, telling the reader what an insect is, what place the butterfly takes in nature, how to capture, set and care for specimens, and then describes each British species from the egg to the imago in clear and simple language, and in almost every instance gives admirable drawings of the caterpillar, chrysalis, and both surfaces of the imago. As there are no less than 266 figures in illustration of sixty-eight species, the collector should have no difficulty in determining any specimen of butterfly in any of its stages (except the egg) that he may chance to find. A book such as this should give a great impetus to the study of the preparatory stages of British butterflies, a section of entomology which is usually neglected in favour of the mere collection and arrangement of the perfect insects. A volume such as this on Canadian butterflies would be a very welcome aid to a large number of young people whose interest has been aroused by the beauty and variety of our species, but whose enthusiasm is soon dampened by the difficulty of obtaining any information about them.

"The Book of British Hawk-Moths," by the same author, deals with a somewhat less familiar group, and gives much useful information that it would otherwise be hard to find. The plan of the work is similar to that of the Butterfly book, and it is written in the same clear and simple style. As there are only seventeen species to deal with, the writer is able to go more fully into details respecting them, and to make his work all the more complete and popular. He has also provided artificial keys to the larvæ and imagines, and tables for distinguishing the species where there is

more than one representative of the genus. The fifteen plates with which the volume is illustrated are very beautiful, and are admirably drawn by the author himself. Each species is represented life-size, and is shown as a caterpillar on its food-plant, chrysalis, and imago. There are also eighteen wood-cuts, for the most part illustrating details of structure. It is to be hoped that the author will continue his good work until he has completed the British Lepidoptera, or at any rate the more conspicuous and familiar families.

LIFE HISTORIES OF AMERICAN INSECTS.—By Clarence M. Weed: 1 vol., pp. 272. (\$1.50.) New York: The Macmillan Company.

The publication of a popular book on insects is so rare an event on this side of the Atlantic that we heartily welcome an addition to the number, especially when it is so excellent and satisfactory as the volume before us. Dr. Weed has selected some five and twenty more or less familiar insects, and in a pleasant manner has given some account of their life histories. The chapters are quite independent of each other and arranged in no particular order; the book may therefore be opened at random, and the sketch that may be hit upon read without any detriment to the continuity of the work. Some of them which deal with such creatures as the leaf-miners are naturally very brief, since so little is known about these tiny foes to vegetation, but of other species which have been subjects of particular study on the part of the author we find long and full descriptions. Among the latter may be mentioned the interesting account of the hibernation of aphides, the chapters on "harvest spiders," the "army-worm," etc. Any one, young or old, who has any desire to read about the wonderful creatures that inhabit the world, and to know something about their modes of life, cannot fail to be pleased with this book, and to be led on, we should hope, to make his own observations of their curious habits and strange doings. The volume is handsomely illustrated with 21 full-page plates and nearly 100 figures in the text.

INSECTS AND SPIDERS: their Structure, Life Histories and Habits.—By J. W. Tutt: 1 vol., pp. 116. (1 shilling.) London: George Gill & Sons, Warwick Lane, E. C.

In the Annual Report of the Entomological Society of Ontario for 1896 much attention was paid to the subject of teaching natural history, and especially entomology, in schools, and the desire was expressed that

some handbook might be drawn up for the assistance of teachers in rural schools. The volume before us is the very book that is needed, if only it dealt with Canadian instead of British insects. In England "Object Lessons" are a compulsory part of the curriculum in elementary schools, and the teachers are required to give their pupils a series of simple lessons "adapted to cultivate habits of exact observation, statement, and reasoning." These lessons are to be "on objects and on the phenomena of nature and of common life," and a wide discretion is thus left in the hands of the teacher. In the country schools of Ontario no subject could be more useful than the study in this way of the commonest species of injurious and beneficial insects, and no subject is likely to compare with it in interesting the pupils. A further advantage is the ease with which specimens can be obtained and their life histories traced. Mr. Tutt's volume is admirably adapted for the use of teachers in providing lessons of this kind. After giving a general account of the external structure of insects, their internal organs and metamorphoses, he devotes the "Lessons" to typical common species of each order, giving similar particulars regarding the individuals and any general facts of interest that bear upon them. Each insect treated of is also illustrated with plates and wood-cuts. It is not, however, a text-book for pupils, but is meant for the instruction and equipment of the teachers, affording them an excellent foundation upon which to frame the instructions they are to give to those committed to their charge.

VANESSA MILBERTI.

In "The Butterflies of the Eastern Provinces of Canada," by Rev. C. J. S. Bethune (Ent. Soc. of Ont. Report, 1894), it is stated that individuals of this butterfly were seen as late as the 18th Oct. I saw two specimens on the 25th Oct., flying actively across a street near the Hotel Dieu, Montreal. This usually common butterfly is scarce within the range of my entomological field work, which is principally confined to the north-east slope of Mount Royal, and the streets of Montreal around that neighbourhood. Only one other specimen was seen by me this season, and that was also at a late date, the 19th Oct. My collection specimen was caught in 1894, and since then, I have not seen another in the same district until the above appeared.

This butterfly was common around St. Andrews East, Que., from the 1st to the 4th Aug., 1896. CHARLES STEVENSON, Montreal.

[A specimen was seen on the wing at Port Hope on the 5th of November last.—ED. C. E.]

Mailed December 6th, 1897.

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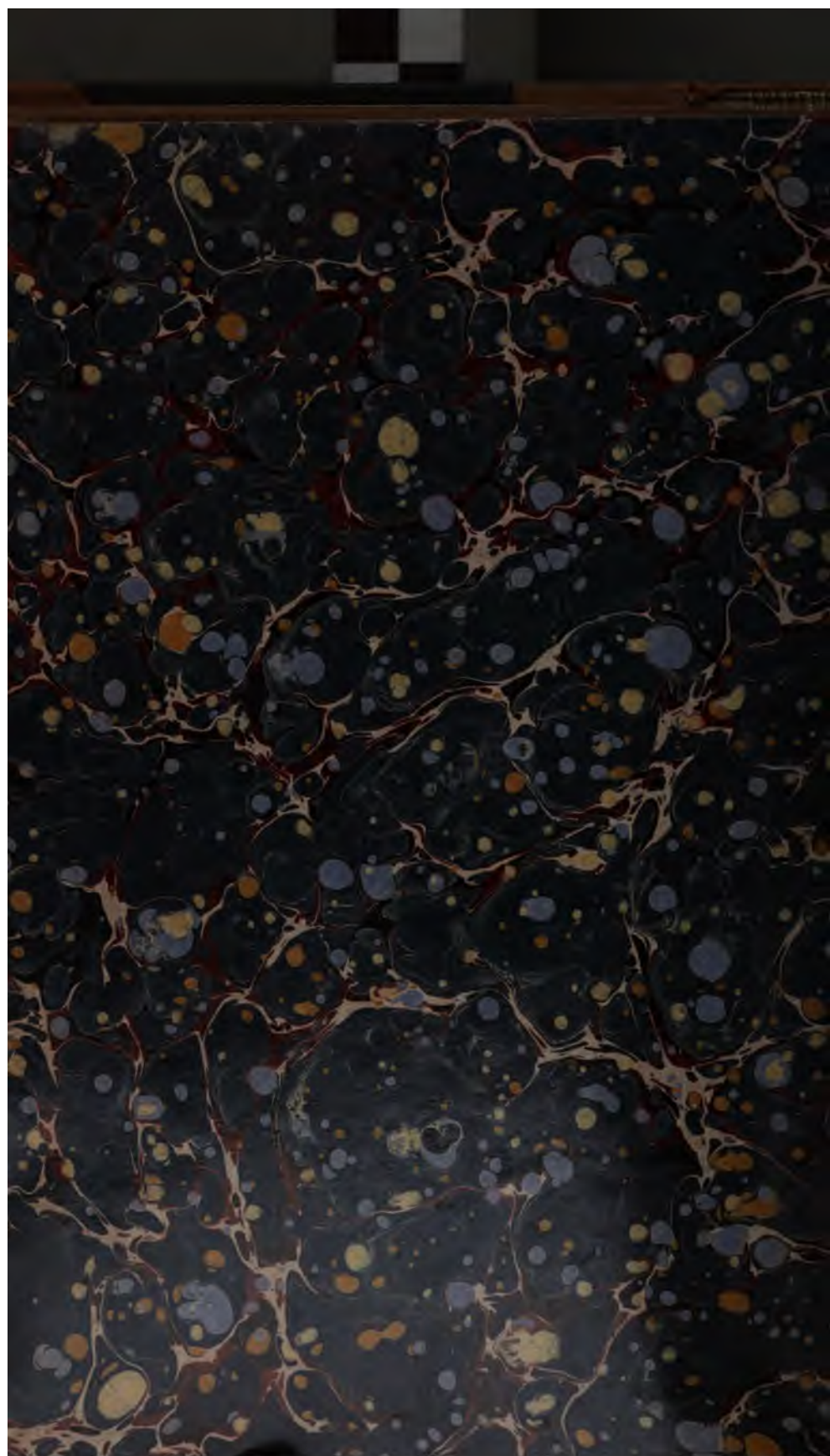
Page 100, 5th line from bottom, for
"oratus" read "ovatus."
Page 168, 12th line from bottom, prefix
"7."
Page 168, 6th line from bottom, add
"Stylurus."
Page 208, 12th line from bottom, for
"tæta" read "læta."
Page 254, 27th line from top, insert a
comma after "stripe."

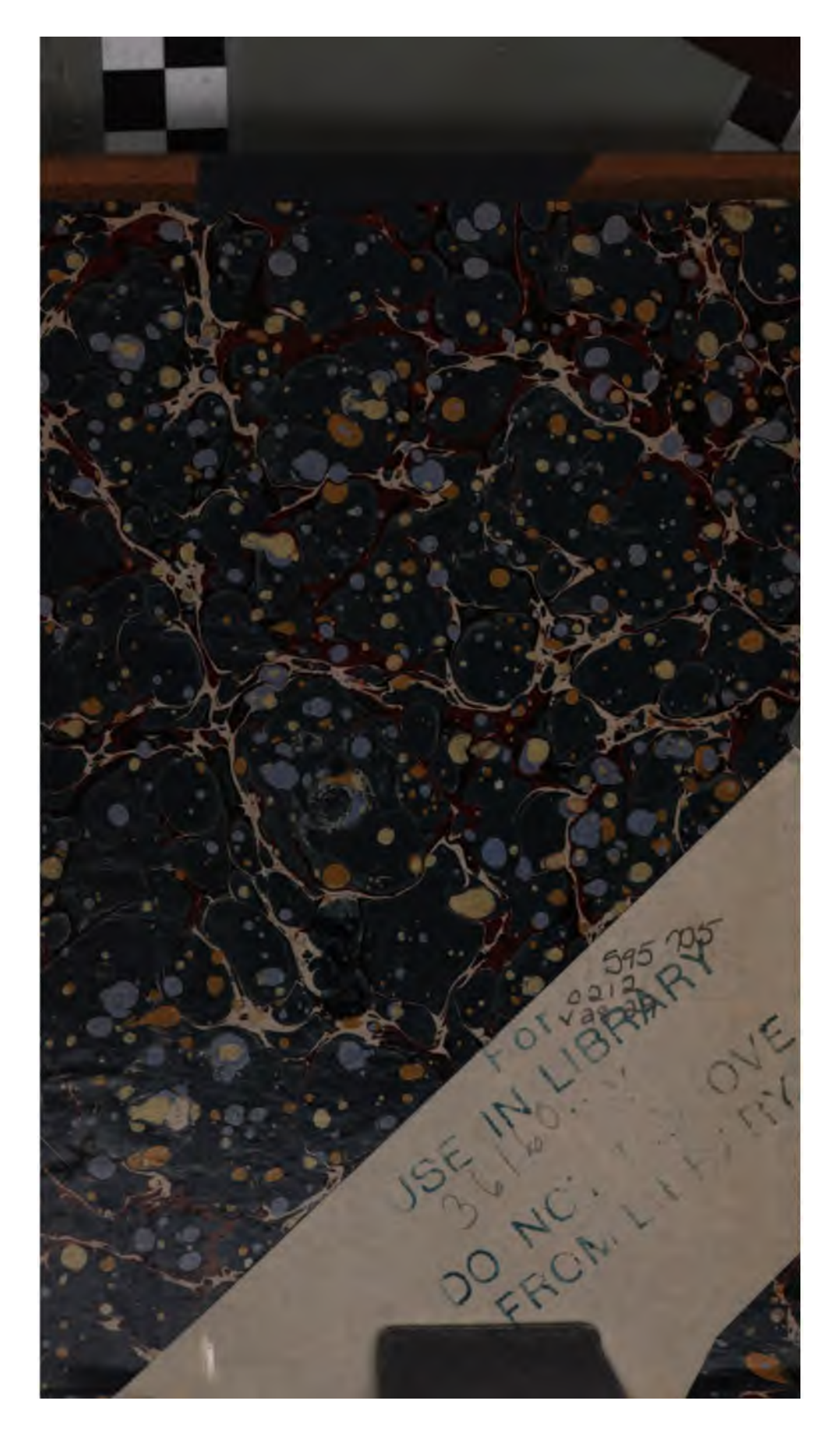












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